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April 18, 1949

STEEL

The Magazine of Metalworking and Metalproducing

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INLAND

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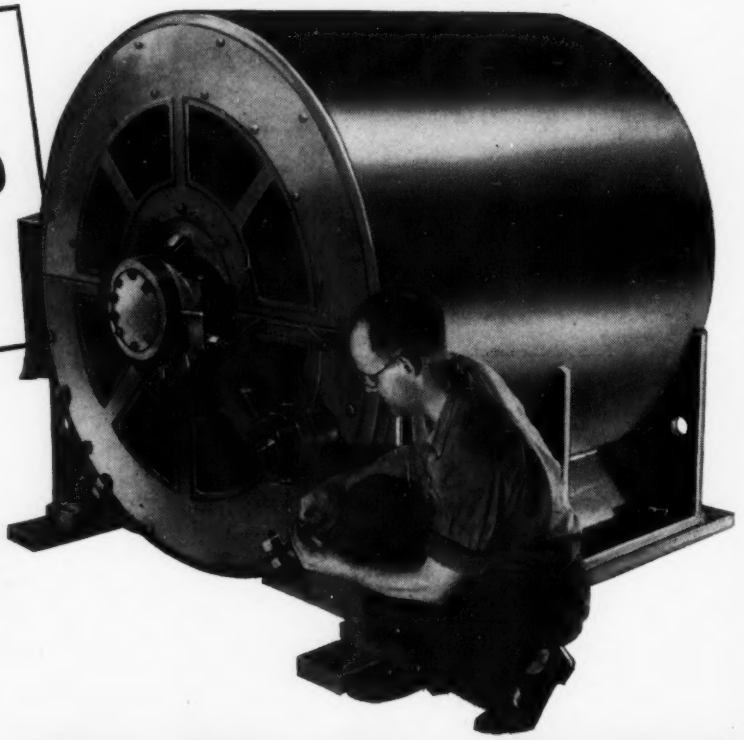

DIRT-PROOF!

AND CORROSION-RESISTANT!

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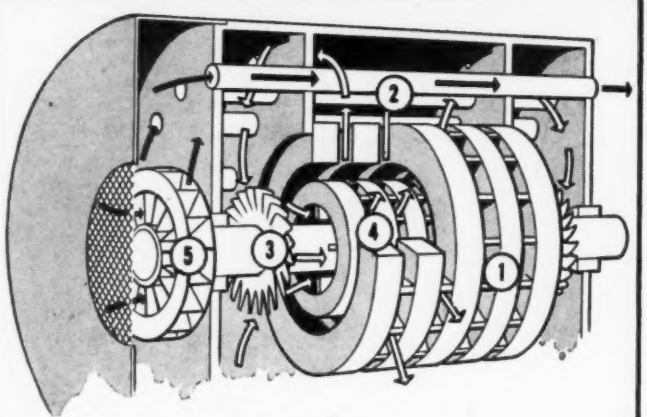

Stator core (1) is surrounded by tubes (2). Internal fans (3) circulate air through ducts (4) in rotor and stator and around tubes, transferring heat to tubes. External fan (5) drives outside air through tubes, removing heat and keeping tubes clean. All electrical parts are enclosed. Dirt cannot enter.

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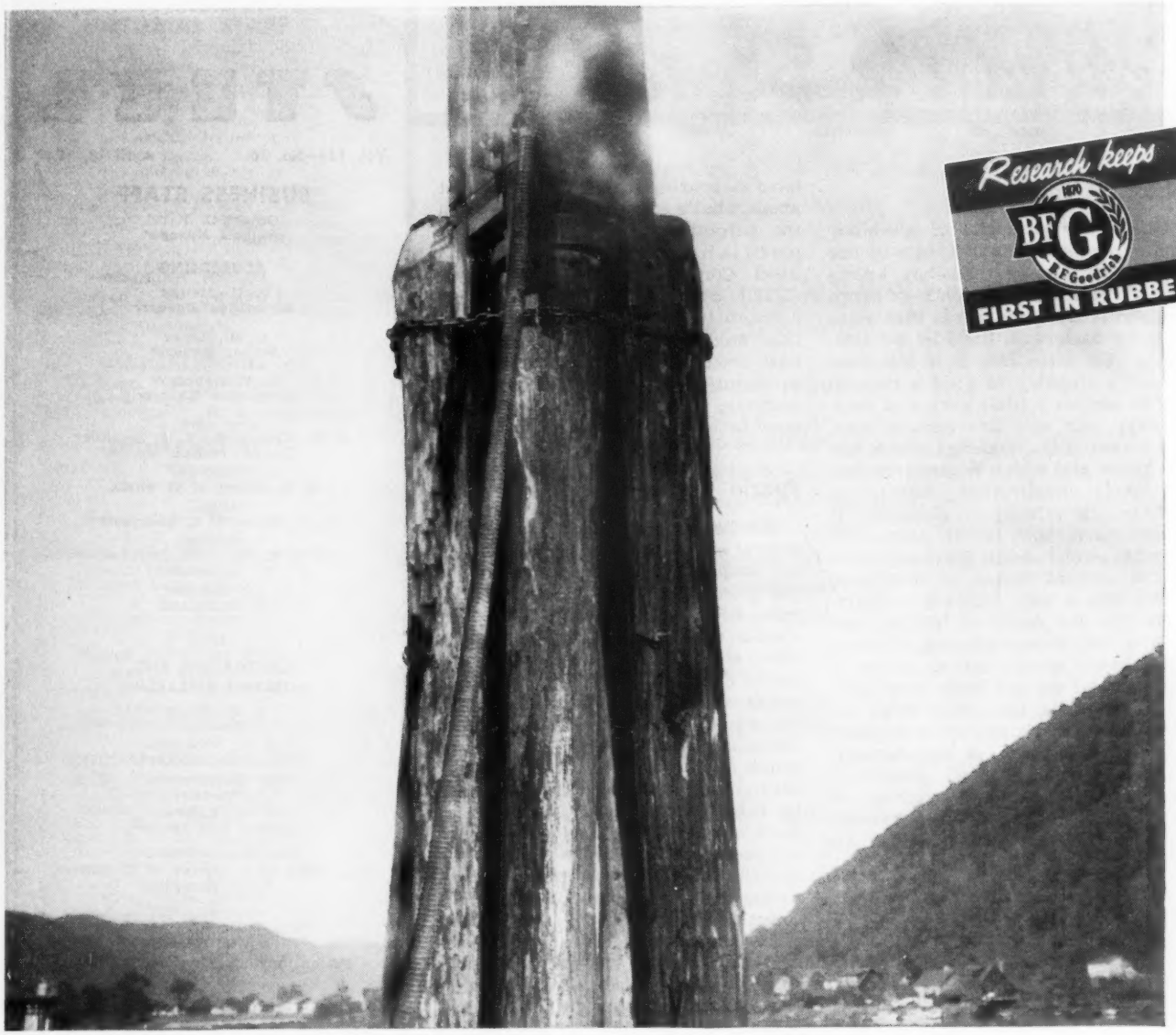

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Behind the Scenes...

Historical Journey

Unless our memories of schoolboy commitments are faulty, this is one of the days every schoolboy knows about. "On the eighteenth of April in Seventy-five" are words that seem to come back with little or no difficulty. So, since this is a historical date, it's probably as good a time as any to present a little historical data. Cmfwyp, our zinc line camera man, has prepared the material which you see below and which reminds us that the whole metalworking industry is still in its infancy. Normally it doesn't seem much like it, particularly after we've been perusing some of the current issues of this book. Seems like a very complex industry, rooted in the dawn of history, and with a tremendous amount of progress already accomplished. Much of the material we see looks very complex—and it is, too. But if we reduce the span of life of this publication to the terms of our cartoons below, the hairy-topped gentleman has had the aid and comfort of STEEL in his conquest of the metals only for the last thirteen *feet* of his journey!

Jets & Rockets

There are a lot of people who are well aware of the inadequacy of our knowledge of metals and their properties. One group of these is the band of technicians working on rockets and jet engines. What would *you* do, for example, if the boss (or a customer) came in and asked you to start producing a gadget where the parts had to resist temperatures of about 5000 degrees Fahr. for several hours at a time—and furthermore, at those elevated temperatures must maintain high strength under conditions of high stress and severe vibration? That's a rough deal—and we'll have to confess that we learned a lot about what's going on in the air from the current issue of *Steel Horizons*, published by Allegheny-Ludlum Steel Corp. It's a wonderful job—and our congratulations to all connected with it. Now we're getting anxious to see some of these new craft sailing through the skies overhead. Have to give us plenty of warning, though. Some of them are gone before they get here!

Puzzle Corner

We have been taken to task by several of the purists in our audience for ambiguity in the statement of our puzzles of late. Please, gentlemen, bear with us! We are merchants of language—and very poor ones, at that. The mathematician's precision is something far above our heads—and about all we can offer in the way of apology is that we try no tricks nor weasel words, that sort of prank is for the birds. We're simple, easy-going guys who make no claims to being wise, and if our puzzles don't seem logical, forgive us—we're not pedagogical! Two weeks ago we had the Rites and the Rongs, and of course that first man who mumbled something had to say he was a Rite, regardless, because if he was a Rong he'd lie about it. So the third man had to be a Rite also. After the fights the other night a group of men stopped in the corner bar and ordered drinks. The check totaled $6, and they agreed to split evenly. Then two of them left without paying. The rest each chipped in two bits extra and the bill was paid. How many men were in the original party? Three minutes, no pencil on this one. Next week we'll tell you how old is Ann.

Shrdlu

RELATION OF THE USE OF IRON TO MAN'S TOTAL TIME ON EARTH,
assuming that man's history is equal to the distance of a journey between Seattle, Washington, and Miami, Florida.
4,000,000 YEARS AGO — AND 3600 MILES FROM MIAMI — HE SHEDS HIS TAIL AND HEADS EAST....
SOMEWHERE BETWEEN NASHVILLE AND CHATTANOOGA TENN., HE DISCOVERS THE ART OF CHIPPING ROCKS....
AT W. PALM BEACH, FLA., HE IS CULTURED AND SMART ENOUGH TO PAINT PICTURES ON CAVE WALLS....
9 MILES NORTH OF MIAMI HE POLISHES HIS STONE TOOLS, TAMES ANIMALS, AND BUILDS SHELTERS....
3 1/2 MILES FROM THE CITY LIMITS OF MIAMI, OR TODAY, HE DISCOVERS THE USE OF IRON!

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STEEL

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STEEL

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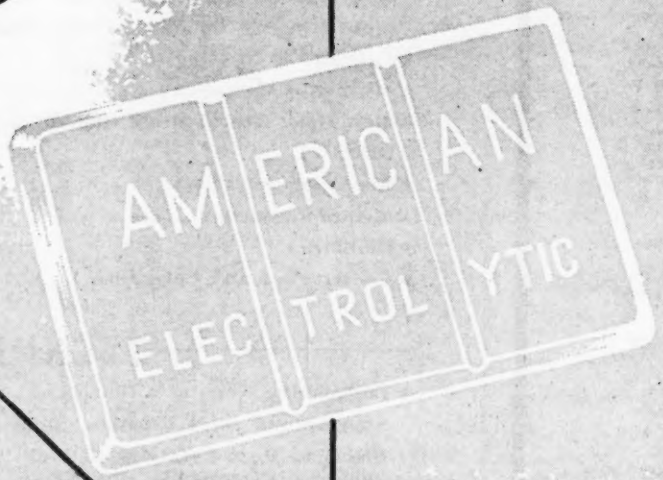

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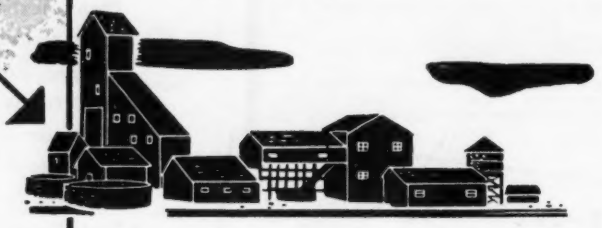

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National Asset

Last week was a busy one for those who attended conventions of technical societies. From coast to coast there were meetings of a dozen or more associations whose programs dealt largely with engineering progress in the metalworking industries.

Obviously no one person could attend all of these meetings but, judging from the reports of editors who did attend them, the composite benefits probably are much greater than is generally realized. One reason why Americans are likely to underestimate the potential values of free discussion of technical problems is that we fail to appreciate the fact that in this country we are able to exchange "know how" that is derived from a much broader base of experience than is available in any other nation in the world.

For example, consider last week's convention of the 4-year old American Society of Lubricating Engineers. At a number of the technical sessions the attendance exceeded 300. Experts on lubrication in many fields presented papers on current problems and discussion from the floor was spontaneous, prolific and constructive. The important factor that may have escaped the attention of many in the audience was that opinions voiced in these discussions came from specialists who work in the world's largest and most diversified source of lubricating problems. In no other single nation is there such a volume of machinery and equipment being designed or in operation which requires specialization in lubricating engineering to the extent it is justified in the United States. In no other nation are manufacturers and users of lubricants and lubricating devices as freely disposed to discuss their technical problems openly as we do in this country.

This broad base for experience and willingness to exchange experience freely exists in connection with the problems of metallurgy, corrosion, welding design and many other fields which were discussed in conventions last week. They afford our technicians opportunities far greater than those which are open to their contemporaries abroad.

While this is a distinct national advantage, it also is a direct challenge to American industry to employ it intelligently and constructively. Hand in hand with this opportunity is a responsibility for our technical personnel to assume a more positive leadership in the engineering progress of the world.

* * *

NEW LIFT FOR GERMANY: Agreement reached last Wednesday by the United States, Great Britain and France on a new "level of industry" for Germany is significant in that it differs sharply from the policy laid down by the victors at the end of the war.

The new accord permits an increase in steel production in Western Germany, construction of 280,000 tons of shipping annually and the retention of 159 plants which previously had been earmarked for reparations. This easing of restrictions follows recommendations of a committee of eminent American industrialists who have been studying the German industrial situation for several months.

Original American policy regarding Germany reflected the stern proposals of former Secretary of the Treasury Henry Morgenthau. He urged that Germany be reduced to an agricultural state. Later the victor nations modified this by declaring that Germany should be limited to a peacetime industry which would permit a standard of living comparable to that of her European neighbors.

Successive shifts in policy regarding Germany have been prompted by the growing realization

(OVER)

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AS THE EDITOR VIEWS THE NEWS

that one cannot punish a culprit nation by restricting industrial activity without seriously injuring every other nation which has natural trade relations with her. The German economy was keyed into that of all Western Europe. Its restoration means almost as much to France, Belgium, Holland, Britain and some other nations as to Germany herself. However, the latest agreement still retains safeguards against the rebirth of a German war machine. —p. 57

* * *

CALIFORNIA NOW THIRD: Success of the Western Metal Congress and Exposition held in Los Angeles last week helps to emphasize the rapidly increasing importance of the metalworking industries on the West Coast.

According to the latest census, California now has 4860 metalworking establishments. This places her in third place, following behind New York with 7752 and Illinois with 5632. Ohio, Michigan and Pennsylvania trail California in the order named.

That many of California's metalworking plants still are small in size is shown by the census figures on metalworking employment. Here California ranks eighth with 296,986 employees. Michigan leads with 799,446 and Ohio is second with 739,141. A favorable factor in California's growth industrially is the diversity of her metalworking plants. This was demonstrated by the wide scope of engineering problems discussed at last week's meetings. —p. 56

* * *

MORE STEEL, MORE CARS: Although activity throughout the metalworking industries continues spotty, a quick survey of the automobile industry shows that many car builders established postwar assembly records in March.

This spurt is attributed largely to improved steel supply. Indicative of how manufacturers are translating additional steel tonnage into greater automobile output is Studebaker's production of 26,897 cars and trucks in March—the best production record in its history. Packard's deliveries of cars in March set a new postwar record. Buick assembly lines have gone to two shifts, increasing weekly output to 8000 units. Chevrolet's production in March was at a postwar peak. These and other records reflect the confidence of automobile manufacturers in the continuing demand for their products.

Meanwhile, signs of labor unrest have been mounting. With contracts with unions up for negotiation soon, events of the next few months may have an important bearing upon the continuation of motor car output at present levels. —p. 67

* * *

FEWER TOOL BUILDERS: As guest speaker at the Savannah meeting of the American Machine Tool Distributors' Association, Tell Berna, general manager of the National Machine Tool Builders' Association, pointed out that since the end of the war at least 30 machine tool companies have passed out of the picture either through liquidation or through mergers with other machine builders.

While some shrinkage of this kind usually is prevalent among builders of heavy equipment in many fields following wartime expansion, the result in the case of machine tools is to weaken the national defense structure. Although most of the machines made by the companies that disappeared still are being built by other companies, the potential capacity for building them in a period of emergency demand has been reduced considerably.

This is a factor that should not be ignored in planning for mobilization of industrial resources for national defense. —p. 58

* * *

ABC OF BESSEMER STEEL: Sixth in the series of articles on the making and finishing of steel is one entitled "Production of Bessemer Steel", which is being presented in three parts. Part I appeared in last week's issue, Part II is in this issue and Part III will appear in the issue of Apr. 25. The author is H. W. Graham, vice president and director of technology, Jones & Laughlin Steel Corp., Pittsburgh. He was assisted by Robert E. Edwards and Wayne G. Laughlin of the same company.

Readers of this article will recognize it as one of the most complete and yet concise in the literature of bessemer steel. In the current issue the author and his associates deal with the size of earlier and present bessemer converters. They conclude that the limit of converter capacity has not been determined and that it appears to be restricted only by economic considerations and by the extensive changes to supplementary facilities required to service larger units.

The current installment also deals with the three stages of the converter blow. This authoritative article is well worth reading. —p. 114

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

NONFERROUS PINCH?—Warning that the United States and the Marshall Plan countries should locate and develop new reserves of nonferrous metals to reduce their dependency on imports is sounded by the Economic Cooperation Administration (p. 53). Production of these metals generally is considerably above prewar averages but the trend toward greater consumption is continuing. Fairly substantial increases in world output are expected by 1952-53.

ALLOCATIONS— Allotments of steel to favored projects under the voluntary allocations program will be cut sharply at start of the second half (p. 57). Only 272,244 tons are scheduled under the July program, compared with 442,415 tons monthly at present. Freight cars will take the most severe cut, and are slated to receive only 25,000 tons in July, one-seventh of the present monthly allocation of 174,953 tons.

GERMAN INDUSTRY—Limitations on industrial production in Germany have been relaxed by the three western powers and output of aluminum, ocean-going vessels, synthetic ammonia, bearings, vanadium, heavy machine tools will be permitted (p. 57). Removal of factories from the western zone will be reduced, thus effecting industrial capacity increases.

WHAT AGE RETIREMENT?—Reduction in the retirement age of coal miners from 62 to 60 not only will increase the cost of producing coal but may have a considerable influence in the pension demands of workers in the metalworking industries (p. 59). Cost of providing pensions for workers retiring at age 60 is about 50 per cent greater than for workers retiring at age 65, provided the amount of benefits remains the same.

WESTERN METAL SHOW— Twenty-five thousand persons visited the booths of 211 exhibitors at the Western Metal Congress and Exposition in Los Angeles (p. 56), attesting to the rising industrial importance of the Pacific states and particularly California. The latter now ranks third in the nation in number of metalworking plants, eighth in metalworking employment.

AUTO OUTPUT UP—An easier steel supply is being translated into greater production of new passenger cars (p. 67). Some automakers are producing at alltime high levels, many are setting postwar records. Sales are holding up well despite expectations that further price reductions are coming.

NEW LOOK IN PENTAGON— Some changes are being effected in the national defense organization since Louis Johnson became secretary (p. 60). The new armed forces chieftain is striving to streamline the defense setup, eliminate the bickering and jealousy between departments. A major job confronting the new secretary is the establishment of a nucleus for industrial mobilization for possible future emergency and the obtaining of the necessary standby powers to make such an organization effective.

HERE AND THERE IN INDUSTRY—Labor disturbances show a tendency to increase (p. 68) as the time for negotiating on new wage contracts approaches . . . . Granite City Steel is starting construction of a new $1.5 million open hearth (p. 70) which will increase steelmaking capacity by 125,000 tons annually . . . Automakers continue the outstanding consumer of alloy steel products and last year received nearly a third of total shipments (p. 64) . . . Machine tool sales officials will return to school again this summer (p. 65). Four conferences are scheduled at leading universities, modeled after the sessions at Cornell in 1948 . . . Industrial production is maintained at a high level despite the clear signs of softening demand. This publication's index for the second week of April stood at 172 per cent of the 1936-39 average (p. 72) . . . Steel ingot production established an alltime record in March with 8,388,965 net tons produced (p. 55). . . . .Hupp Corp. is starting the manufacture of transmission drives for farm implements and new products for the automotive and refrigeration industries (p. 70).

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Nonferrous Output, Use Increasing

ECA warns United States and Western Europe must develop new reserves to reduce dependency on imports as trend toward greater consumption continues

WORLD production of most nonferrous metals is well above prewar averages and further gains are expected in the future.

Trend toward greater consumption, however, indicates continued tight supply, and if the United States and Marshall Plan countries are to reduce their future dependency on imports, they must strive to locate and develop new ore reserves and expand existing reserves to the fullest extent possible.

These are conclusions reached by the Economic Cooperation Administration as result of a survey made to determine the tonnages of these metals which can be exported without undue strain on the domestic economy.

Nonferrous Tightens—ECA reports that in 1948 the world consumption-production position of practically all nonferrous metals—especially aluminum, copper, lead and zinc—was fairly tight and that industry had to reduce its use to available amounts.

Since the beginning of 1949, supplies of these metals have eased in the United States and prices of some have dropped sharply.

Production outlook for principal nonferrous metals is summarized by ECA as follows (all figures in metric tons, 2204.6 pounds):

Aluminum—World output in 1949 probably will be about the same as in 1948, which was 1,546,000 metric tons. By 1952-53, production may increase to 1,900,000 tons.

Copper—No significant increase in production is expected in 1949, especially in the United States. In 1950 and 1951, the U. S. situation may improve as result of projects now under way in Butte, Mont., and San Manuel, Ariz. World production of copper in 1948 was 2,471,000 tons. Production of 2,700,000 tons is believed possible by 1952-53.

Lead—No sizable increases in world lead production can be anticipated because of a universal shortage of lead concentrates. Production in 1948 amounted to 1,841,000 tons. Possible tonnage by 1952-53 is estimated at 2,150,000 tons, with Marshall Plan countries and their territories contributing 500,000 tons.

Zinc—Outlook for zinc is favorable. U. S. production may increase 45,000 tons and Canada is expected to increase output. A large increase, from 1,728,000 tons in 1948 to 2,170,000 tons in 1952-53, is expected. Belgian and German production will rise.

Cadmium—This by-product of zinc smelting and refining has been fairly tight but should increase with zinc. About 3400 tons were produced in the United States last year. Production in France, Austria, Italy and the United Kingdom will be increased by facilities to be completed by 1952-53.

Nickel—Excluding Russia and her satellites, the world supply of nickel depends on Canada almost entirely. Small amounts are provided by the French colony in New Caledonia, the United States and Europe. Canada raised production 10 per cent in 1948 and may increase further in 1949.

Tin—Production has been recovering steadily since the war. Last year's production is estimated at 152,000 tons, compared with 126,000 tons in 1947. Chief factor in improved situation has been production in Malaya and Indonesia, which, if maintained, will restore output to prewar level of 170,000 tons annually by 1950.

Titanium — World supplies are ample to cover present and foreseeable future demands.

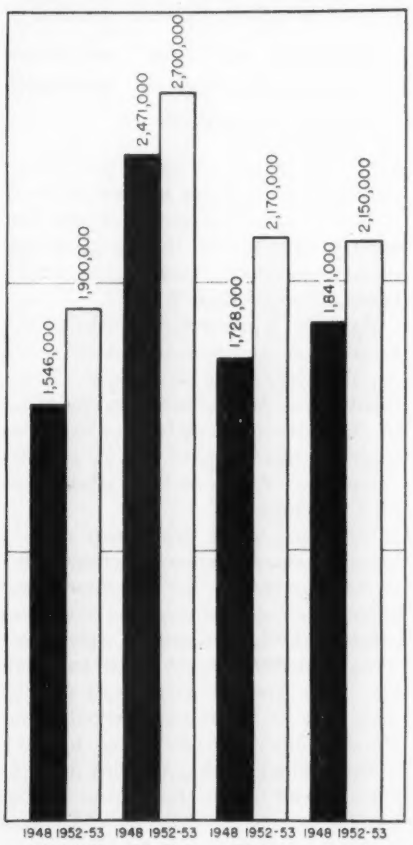
Antimony — Any significant increase in production depends to a large extent on developments in China. Current world supply situation is easy.

Tungsten — Situation is becoming less critical. World production in 1948 is estimated at 30,000 tons of 60 per cent tungsten oxide. The 1949 figure should be higher if production holds in China, Korea and Bolivia.

Molybdenum—The 1948 output was about 15,000 tons, excluding Russia. World Consumption, also excluding Russia, was 14,000 tons.

World Nonferrous Output

(Metric Tons)



Productivity in Zinc Up

Output increase of 55 per cent per man-hour disclosed at Zinc Institute meeting

ZINC production has increased 55 per cent per man-hour in the last ten years, and overall operating costs have risen 105 per cent, W. C. Page, Salt Lake City, assistant general manager, U. S. Smelting, Refining & Mining Co. told 300 delegates attending annual meeting of American Zinc Institute in St. Louis Apr. 11-12

The meeting closed with election of Edward H. Snyder, president, Combined Metals Reduction Co., Salt Lake City, as new president of the institute. He succeeds Howard I. Young, president, American Zinc, Lead & Smelting Co., St. Louis.

Other Officers—Clarence Glass, Anaconda Sales Co., New York, George Mixter, U. S. Smelting, Refining & Mining Co., Boston, and Raymond F. Orr, Athletic Mining & Smelting Co., Ft. Smith, Ark., were elected vice presidents, and Erle V. Daveler, New York office, American Zinc, Lead & Smelting Co., treasurer. Ernest V. Gent, New York, was re-elected executive vice president and secretary.

Directors included Messrs. Mixter, Orr and A. E. Bendelari, Lexington,

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Ky., O. W. Bilharz, Baxter Springs, Kans.; C. M. Chapin Jr., New York; M. L. Havey, New York; W. B. Porter, Danville, Ill.; S. H. Levison, New York; and R. G. Kenly, New York.

Cites Mechanization — Mr. Page said the 55 per cent increase in production is attributable mainly to mechanization and improved equipment. He estimated the average large lead-zinc mining company now has about $30,000 invested in tools for each working face.

Zinc production capacity in the United States is sufficient to meet all domestic needs and allow some for government stockpiling, Mr. Young asserted in an address on "The Zinc Supply in 1949." He estimated total national production of 929,000 tons this year.

N. B. Randolph, vice president, Granite City Steel Co., said the strong point in sheet steel demand today is for galvanized sheets for roofing and other rural uses. He predicted a continuing "tremendous" demand for many months.

New Horizons — New horizons in the field of synthetic minerals were forecast by Julian W. Feiss, assistant to the director, United States Bureau of Mines.

He predicted the trend toward lighter metals will continue, and asserted that atomic power, electronics and recent allied developments will demand new metals. He added: "The availability of power supplies through atomic energy may well govern operation of the mining industry in the future."

Discuss Costs—R. A. Young, vice president, American Zinc Co. of Illinois, also touched on industry costs. In a discussion of seven factors entering smelting costs, he said labor has gone up an average of 125 per cent since 1939; coal 50 to 75 per cent; operating supplies 25 to 300 per cent; maintenance supplies 75 to 100 per cent; freight up to 66 per cent, and operating capital requirements 300 per cent. Power cost has risen the least.

R. G. Kenly, manager of the Metal Division, New Jersey Zinc Sales Co., warned that the now high priced zinc industry is threatened by the competition of aluminum.

Productivity — Evan Just, director of the Strategic Materials Division, Economic Cooperation Administration, said that ECA's principal opportunities to improve the future raw materials position of the United States are in the field of raising productivity of participating countries in iron, copper, lead, zinc, aluminum, phosphates and potash.

"However, it does not seem likely," he said, "that ECA activity will have an important impact on domestic producers of copper, lead, zinc and aluminum. Whatever level is established in regard to nonferrous metals, it is not likely that any output established as a result of ECA will create a net surplus over European requirements."

FACTORY-BOUND: A trainload of scrap from locomotives is almost ready to be moved from Pennsylvania Railroad's Conway, Pa., yards. At left are the various piles of sorted parts to be salvaged, while at right work is just being started on a locomotive. Acme photo

Lead Output Holds Steady

Members of Lead Industries Association receive favorable reports on outlook

TIMELY review of lead's position in the rapidly changing nonferrous metal market was presented at the 21st annual meeting of the Lead Industries Association, held at the Drake Hotel, Chicago, Apr. 8.

Felix E. Wormser, president of the association, and vice president of the St. Joseph Lead Co., New York, pointed out "a free market, operating in the American system of free enterprise, has brought about a swift correction of the serious world-wide lead shortage."

Increased world production now in prospect should balance decreases due to exhaustion of known mines and suspension of operations of marginal mines, said R. F. Goodwin, vice president, American Smelting & Refining Co., New York. Foreign lead for the next two or three years should continue at about 850,000 tons, he said.

Investment High—Amount of capital invested in new mining or milling plants, in rehabilitation of old plants and intensified and widened exploration during 1948 was probably at an all-time high, according to J. B. Haffner, general manager, Bunker Hill & Sullivan Mining & Concentrating Co., Kellogg, Idaho. Almost punitive taxation, declining metal prices, high cost of labor and supplies and the tariff situation are now hampering that section of the mining industry.

This market condition is rapidly reaching a point where mine production in Utah and the Southwest also will be adversely affected, said F. A. Wardlaw Jr., general manager, International Smelting & Refining Co., Salt Lake City, Utah.

Francis Cameron, vice president, St. Joseph Lead Co., New York, reviewing the lead production figures in the midwestern and eastern states, forecast that his company's mines can continue to sustain for some years to come their present rate of production if given a period of profitable metal prices.

When the lead market eventually finds a balance between supply and demand and a more normal price level, the addition of a timely calculated stockpiling program should again find the primary and secondary markets working interdependently, said Marc S. Goldsmith, president, Goldsmith Bros. Smelting & Refining Co., Chicago. The future secondary lead market is expected to hold closer to the primary market price.

Use of Lead Cut—R. K. Spofford, purchasing agent, Okonite Co., Passaic, N. J., said that constant changes in the requirements for electric cables has resulted in most instances in a

reduction in the amount of lead sheathing necessary.

W. P. Carroll, manager, Metal Department, National Lead Co., New York, cited instances where inroads were made in the use of lead in the chemical and process industries by substitute materials. By comparative testing and proper education, he said it is hoped the number of substitutes may be materially reduced. Also, the 33 per cent decline in the lead price will help curtail the use of such substitutes.

Reduce Battery Inventories — Expectations of the storage battery industry are for low production and sales of replacement batteries until July, according to H. A. Harvey, vice president, Auto-Lite Battery Corp., Niagara Falls, N. Y.

Members of the association unanimously re-elected the board of directors who, in turn, re-elected the officers.

Report on Pipe Corrosion

TENDENCY of zinc coating or galvanizing on steel water pipe to dissolve varies with the substances in solution in the water, it is revealed in a study by the Committee on Steel Pipe Research of American Iron & Steel Institute.

The first phase of this project, in progress for 1½ years, was reported at the annual convention of the National Association of Corrosion Engineers at Cincinnati, Apr. 13, by R. B. Hoxeng, research associate of Case Institute of Technology, and C. F. Prutton of Carl F. Prutton & Associates, both of Cleveland.

The program was designed to determine the causes of exceptions to the usual long life of galvanized steel pipe in severely corrosive natural waters, and to find means of overcoming this trouble.

Lubrication Progress Highlighted

PROGRESS of the lubricating industry in keeping apace with technological improvements in all branches of the metalworking industry and allied fields was convincingly demonstrated at the fourth annual convention and lubrication exhibit of the American Society of Lubrication Engineers, Hotel Statler, New York, Apr. 11-13.

Attended by approximately 700 persons, most of them from industrial, research and educational institutions, the 3-day affair included seven well-balanced technical sessions and a concurrent exhibition, with 33 participating companies.

Practical attitude in approaching lubricating problems was reflected in the 22 technical papers presented by authorities employed by lubricant and lubrication equipment suppliers and users and by research engineers from independent research organizations. Among the subjects discussed were: Development of grease lubricating systems, grease lubrication in the machine tool industry, the role of cutting fluid as a lubricant, improved high speed roller bearings, dissipation of frictional heat, progress in instrument lubrication, hydrodynamic aspects of porous bronze bearings, service degradation and maintenance of petroleum oils.

Mechanized Processes — Granville M. Read, chief engineer, E. I. du Pont de Nemours & Co., Wilmington, Del., in his paper, "What Lubrication Means to Management," pointed out that the trend in business today is toward highly mechanized processes, requiring proper lubricants and maintenance to avoid machine stoppage.

E. L. Shaner, chairman of the board, Penton Publishing Co., and editor - in - chief, STEEL, was guest speaker at the society's annual banquet.

New Officers—Newly elected officers of the society are: Charles L. Pope, Eastman Kodak Co., president; B. H. Jennings, Northwestern University, vice president at large; W. F. Leonard, secretary-treasurer; A. J. Zino, Swan-Finch Oil Corp., eastern vice president; Carl Schmitz, Crane Packing, midwest vice president; S. K. Talley, Shell Development Co., western vice president.

Directors are: F. L. Gray, Carnegie - Illinois Steel Co.; Edwin Crankshaw, Cleveland Graphite Bronze Co.; M. L. Langworthy, Texas Canada; V. A. Ryan, Crown Cork & Seal.

Steel Output Sets Record

All-time highs for month and quarter lifts 12-month total to over 90 million

GREATEST production of raw steel in history poured out of the steelmaking furnaces in the United States during March and the first quarter of this year, according to the American Iron & Steel Institute.

The record first quarter yielded 24,053,181 tons of ingots and steel for castings. This output was more than 2 million tons greater than in the like 1948 period and 506,972 tons larger than in the fourth quarter of 1948, the previous record quarter.

For the first time in any three month period, steelmaking furnaces were operated at over 100 per cent of theoretical capacity in the first quarter of this year. The average was 101.5 per cent.

The record March production totaled 8,388,965 tons, with furnaces being operated at 102.7 per cent of capacity, the highest rate of operations recorded for any month. The tonnage exceeds the previous peak month, January, by more than 200,000 tons.

Total production of raw steel for the period April, 1948, through March, 1949, amounted to more than 90,500,000 tons, an all-time record for any 12-month period.

Steel Ingot Production Statistics

	Estimated Production—All Companies									
	Open Hearth		Bessemer		Electric		Total		Calculated weekly production	Number of weeks in mo.
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	
1948										
Jan.	6,768,497	95.5	343,169	77.5	361,110	79.0	7,472,776	93.6	1,686,857	4.48
Feb.	6,245,338	94.3	340,596	82.3	354,270	82.9	6,940,204	93.0	1,676,378	4.14
Mar.	6,841,578	96.6	363,235	82.0	403,322	88.2	7,608,135	95.3	1,717,412	4.43
1st qtr.	19,855,413	95.5	1,047,000	80.6	1,118,702	83.4	22,021,115	94.0	1,693,932	13.00
Apr.	5,640,168	82.2	185,089	43.2	392,900	88.7	6,218,157	80.4	1,449,454	4.29
May	6,799,289	96.0	355,562	80.3	416,801	91.1	7,571,652	94.8	1,709,177	4.43
June	6,481,879	94.5	356,810	83.2	417,665	94.3	7,256,354	93.8	1,691,458	4.29
2nd qtr.	18,921,336	90.9	897,461	69.0	1,227,366	91.4	21,046,163	89.7	1,617,691	13.01
1st 6 mos.	38,776,749	93.2	1,944,461	74.8	2,346,068	87.4	43,067,278	91.9	1,655,797	26.01
July	6,346,423	89.8	324,991	73.6	395,610	86.7	7,067,024	88.7	1,598,874	4.42
Aug.	6,631,157	93.6	371,205	83.8	435,246	95.2	7,437,608	93.1	1,678,918	4.43
Sept.	6,592,226	96.3	387,153	90.5	436,231	98.7	7,415,610	96.1	1,732,619	4.28
3rd qtr.	19,569,806	93.2	1,083,349	82.5	1,267,087	93.5	21,920,242	92.6	1,669,478	13.13
9 mos.	58,346,555	93.2	3,027,810	77.4	3,613,155	89.4	64,987,520	92.1	1,660,386	39.14
Oct.	7,118,299	100.5	409,545	92.5	459,268	100.4	7,987,112	100.0	1,802,960	4.43
Nov.	6,922,656	100.9	411,049	95.9	454,217	102.6	7,787,922	100.7	1,815,366	4.29
Dec.	6,925,300	98.0	393,609	89.1	452,266	99.1	7,771,175	97.5	1,758,184	4.42
4th qtr.	20,966,255	99.8	1,214,203	92.4	1,365,751	100.7	23,546,209	99.4	1,791,949	13.14
2nd 6 mos.	40,536,061	96.5	2,297,552	87.5	2,632,838	97.1	45,466,451	96.0	1,730,737	26.27
Total	79,312,810	94.9	4,242,013	81.2	4,978,906	92.3	88,533,729	94.0	1,693,453	52.28
1949										
Jan.	7,287,683	101.1	408,552	92.6	487,260	93.8	8,183,495	100.2	1,847,290	4.43
*Feb.	6,633,779	102.0	379,698	95.3	467,244	99.6	7,480,721	101.4	1,870,180	4.00
† Mar.	7,465,494	103.6	430,176	97.5	493,295	95.0	8,388,965	102.7	1,893,672	4.43
†1st qtr.	21,386,956	102.2	1,218,426	95.2	1,447,799	96.0	24,053,181	101.5	1,870,387	12.86

* Revised. † Preliminary figures subject to revision.

For 1949, percentages of capacity operated are calculated on weekly capacities of 1,626,717 net tons open hearth, 99,559 net tons bessemer and 117,240 net tons electric ingots and steel for castings, total 1,843,516 net tons; based on annual capacities as of Jan. 1, 1949, as follows: Open hearth 84,817,040 net tons, bessemer 5,191,000 net tons, electric 6,112,890 net tons, total 96,120,930 net tons.

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Metal Show Attests to West's Advance

Area's rising industrial importance reflected in record attendance at Los Angeles congress where more than 200 exhibits were seen by more than 25,000

AT THE END of last week, it was estimated that over 25,000 persons had visited the booths of the 211 exhibitors at the Western Metal Congress and Exposition in Shrine Convention Hall in Los Angeles, and that nearly 5000 of these visitors had attended the sessions of the five participating technical societies.

The Congress and Exposition thus was by far the most successful of the six shows held to date on the West Coast and it also compared favorably with the National Congress in Philadelphia last October from the standpoint of both exhibits and technical program. The latter drew 34,286 registered visitors to the booths of 296 exhibitors.

Western In Flavor—The Los Angeles show was decidedly "Western" in flavor since 90 of the 211 exhibitors were from the 11 western states and, of course, the attendance was largely from the same area, and, more specifically, from southern and central California. Attendance from the western states at the Philadelphia show last fall was only 182.

The record attendance and interest in last week's show are tangible evidence of the increasing importance of the West industrially. Latest census figures reveal that California now is in third place in the nation with 4860 metalworking plants, being exceeded only by New York with 7752 and Illinois with 5632. Ohio, Michigan and Pennsylvania follow in order.

Many Small Plants — Of course, California has a large percentage of small plants, but Californians confidently believe a large portion of them some day will attain the size and importance of many of their eastern contemporaries. California ranks eighth in metalworking employment with 296,986 workers, Michigan first with 799,446 and Ohio second with 739,141. In 1939, California was in fifth place with 2441 plants and eleventh with 102,847 workers.

Los Angeles county alone has 3235 metalworking plants and the San Francisco Bay area 989, compared with 1512 and 844, respectively, in 1939. Employment comparisons for the two years are: 191,297 and 69,818 for Los Angeles; 60,983 and 35,645 for San Francisco.

Steel ingot capacity of five western states has increased 148 per cent in the past ten years and finished steel capacity also is expanding rapidly. Among new facilities are an 86-in. hot sheet and strip mill which will go in Jan. 1, 1950. Two new cold sheet and strip mills are well under way. A new continuous rod mill went in last fall, along with a new wire mill. Foundations now are being poured for a second rod mill and a new wire unit will start Apr. 17.

Societies Grow—As might be expected, western chapters of national technical societies also have grown in size and in the scope of their activities. The five-day series of meetings sponsored last week by five societies — American Welding Society, American Foundrymen's Society, American Institute of Mining & Metallurgical Engineers, Society for Non-Destructive Testing and American Society for Metals—provided a well rounded program presented by 96 nationally-recognized authorities on metallurgy, metallography, corrosion, welding, brazing and cutting, metals for applications at both high and low temperatures, heat treating, etc.

The show committee was headed by E. R. Babylon, Kaiser Co., as chairman and by James B. Morey, International Nickel Co., and S. R. Kallenbaugh, Timken Roller Bearing Co., as vice chairmen.

Shown above are some of the exhibits at the metal show

Expect Lower Prices

West Coast steel buyers anticipate decline with demand tending downward

STEEL consumers on the West Coast are looking for lower prices. This is reflected in efforts to reduce inventories, in a reduction of orders to a hand-to-mouth buying basis, in cancellations of mill orders and rejections of offered allocations.

The trend appears to be general all along the West Coast. It is affecting steel warehouses, which report their first quarter business ran one-half to one-third below the first quarter last year. Jobbers, in turn, have been cutting their orders for many products; they, too, don't want to be caught with topheavy inventories if a price cut comes.

Typical warehouse comment is that "everyone appears to be working off inventories." Most jobbers say they are not ordering past the second quarter.

Expect July Decline—Some fabricators are working on the theory that prices will start to slide after July 1. Most users believe sheets and plates will be least affected, and alloy steels, wire products, structurals and other items in similar plentiful supply most affected in any price reduction consideration.

So far mills have given no signs or hint that price cuts are in the offing. One indication is becoming clearer, however: That is the prospect that increasing competition may force price readjustments.

Reports have been circulating in the San Francisco area that Colorado Fuel & Iron Corp. is invading the coast market with wire products, and Jones & Laughlin Steel Corp. is said to be seeking orders for structural shapes and other products. In effect this means those mills will have to absorb freight in an effort to compete with western mills.

Allocations Cutbacks

Earmarked steel by July will total only 272,244 tons. Rail car program slashed

FURTHER evidence of the rapidly improving steel supply situation is provided by additional sharp cutbacks in the voluntary allocation programs.

Beginning in July steel on allocation will total only 272,244 tons, which compares with 442,415 tons scheduled for June, and with 594,231 tons scheduled in February.

Sharp tonnage reductions, to become effective in July, were effected at last week's meeting of the Steel Products Advisory Committee to the Office of Industry Cooperation. The cut in the railroad car program was especially severe. This program after June will be but a shadow of its former robust self, allocations to it being virtually suspended except for a provisional tonnage of 25,000 tons monthly to care for unforeseen consumer needs. The suspension is due to the virtual disappearance of new freight car orders. At present some 174,953 tons monthly are on allocation for this program.

Tonnage reductions also have been approved for the following programs: Anthracite coal; barges; mining machinery; tanks; warm air heating equipment; tankers; and oil field production equipment.

Increases were effected in the following: Atomic energy projects; farm type grain storage bins; federal aeronautical agencies; federal reclamation projects. The following programs remain unchanged: Baseboard radiation; European Cooperation Administration requirements; Armed Forces; Oak Ridge gas pipeline; and merchant vessels.

Monthly allotments for the various programs beginning in July are:

VOLUNTARY STEEL ALLOCATIONS
(Net Tons Monthly)

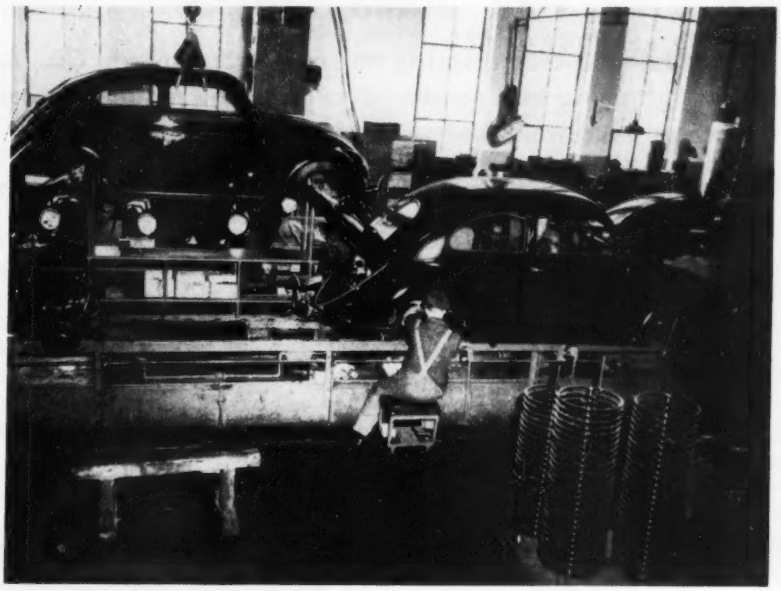
Program	Beginning July	At Present
Warm Air Heating	9,000	26,400
Baseboard Radiation	950	950
Anthracite Mines	1,500	2,000
Mining Machinery	19,000	31,785
Oil Tanker	26,000	31,550
Oil Field Equipment	13,000	16,530
Atomic Energy	16,210	10,340
Grain Storage Bins	8,600	8,400
Freight Cars (Provisional)	25,000	174,953
Barges	10,000	11,202
Aeronautical Agencies	1,000	614
Reclamation Projects	23,588	13,641
Armed Forces	64,371	64,371
Oak Ridge Pipe Line	4,750	4,750
Merchant Vessels	11,729	11,729

Economic Cooperation Administration overall allocation of 159,264 tons remains unchanged.

Studebaker Adds Workers

STUDEBAKER Corp. will add about 700 workers to its payroll this week in anticipation of a further increase in passenger car production, currently at the highest level in the company's history.

Adding of the men will permit company to increase car and truck output to 6500 units weekly, compared with 5100 at the beginning of this year and 4700 a year ago.



GERMAN ASSEMBLY LINE: A dozen years ago, Adolf Hitler promised Volkswagens to any German with 1000 marks to pay for them. The war intervened and the cars never reached the people, though some were made for the German Army. Now at Wolfsburg, the stubby, one-style jobs with air-cooled rear engines are rolling out for civilian consumption at a rate of 40,000 annually. Price has shot up to 5300 marks ($1590) but managers of the plant say they can sell all they can produce.
NEA photo

German Industry Curbs Eased

AGREEMENT was reached last week to relax limitations on German industrial production. An agreement was signed by the military governors for Great Britain, France and the United States permitting Germany to produce aluminum, ocean-going vessels, synthetic ammonia, ball and roller bearings, vanadium, radio transmission equipment, heavy machine tools, heavy tractors and styrene.

Germany previously had been prohibited from manufacturing these products.

At the same time it was announced in Washington that the three Allied powers had agreed to a sharp cut in the number of factories to be removed from western Germany. All or part of 159 plants are to be removed from the reparations list previously agreed upon.

Many Plants Affected—The State Department also said the amount of equipment formerly scheduled for removal but presently to be left there varies from a single piece of equipment in a plant to the entire equipment for an operating factory. The equipment which will be retained in Germany is located in 32 plants in the steel industry, 88 metalworking plants, 32 chemical plants, and seven plants in the nonferrous metal industries. Five of the steel plants produce crude steel and these will raise Western Germany's steelmaking capacity by 165,000 tons a year, resulting in total annual capacity of about 13,465,000 tons.

Germany will be permitted to produce 85,000 tons of primary aluminum yearly and to retain shipbuilding capacity of 280,000 gross tons a year. The size of each ship will be limited to 7200 gross tons with speed of 12 knots. The country also will be allowed to purchase 400,000 gross tons of cargo ships and tankers during the period of the agreement until a peace treaty is signed.

While Germany will be permitted to produce 33 million units of ball and roller bearings, and 20,000 tons of styrene a year, heavy machine tools, except war machine tools, will be produced under a license system.

Germany is still forbidden to produce synthetic gasoline and oil, synthetic rubber, magnesium, beryllium, radioactive and war materials.

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Intensified Tool Selling Urged

Distributors, holding spring meeting in Savannah, Ga., told belt tightening and greater sales effort are required in combatting the current limited recession in business

RECOGNITION that general though not necessarily deep recession of business along a broad front demands tightening of belts and intensification of selling efforts was the underlying theme of the 25th spring meeting of American Machine Tool Distributors' Association.

This meeting, held at General Oglethorpe hotel, Savannah, Ga., Apr. 10-12, drew attendance of 61 men representing 47 member companies, and 58 guests—the latter including machine tool builders and representatives of the technical press.

One significant point brought out during this meeting by guest-speaker Tell Berna, general manager, National Machine Tool Builders' Association, was that since the end of the war at least 30 machine tool companies have passed out of the picture either through liquidation or through mergers with other machine builders.

Mr. Berna bore down on the fact that this trend tends to weaken the national defense structure in that many of these companies were in the heavy machine tool business—vital to national defense. Although some of the machines continue to be built by other companies, the tendency is to liquidate plants by combining operations—thus reducing potential capacity.

Complicates Problems—This trend also complicates the problems of distributors by bringing about competition conflicts in lines of many years' standing. For example, if a turret lathe builder buys out a boring mill manufacturer, the turret lathe company's dealer, already handling a competitive boring mill, often is faced with the Hobson's choice of dropping either the lucrative turret lathe line or the lucrative boring mill line.

Another point brought out by Mr. Berna was that the armed services already are drawing machine tools out of JANMAT reserves which were supposed not to be touched except in the event of a national emergency.

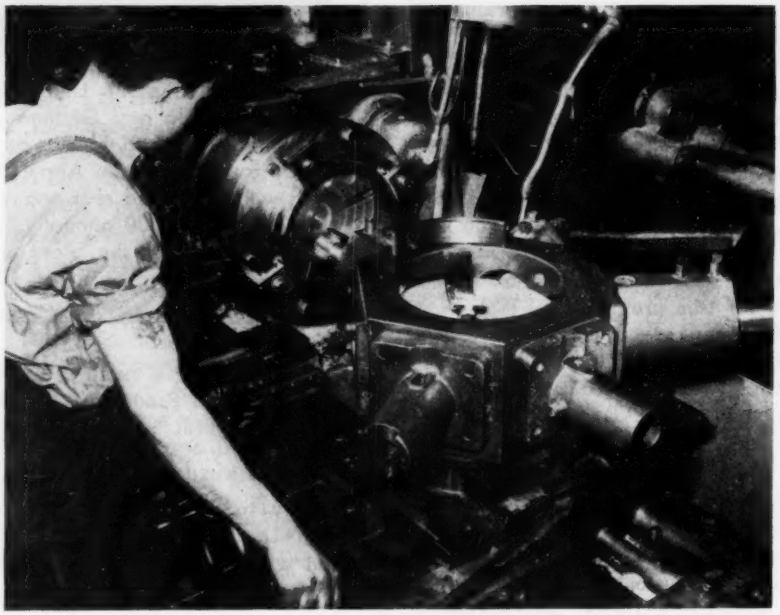
Mr. Berna sees sunshine through the clouds in the way of improved foreign business, possibility of more liberal depreciation allowances, probability that Taft-Hartley act will not be materially changed, and more scientific selling.

Special Machines—A digest of the tool situation was presented by E. B. McDonald, Syracuse Supply Co. This indicates that builders will have to pay much more attention to special machines and special tooling, that they will have to exercise great ingenuity along those lines, and that they will have to speed up quotations and delivery on such items. In many cases these special machines will involve built-in material handling mechanisms.

Thomas R. Rudel, Rudel Machinery Co. Inc., New York, dealt with use and abuse of entertaining. He condemned lavish entertaining as in bad taste, and urged that it be gaged as to its value in building worthwhile and lasting business friendships. On the same panel discussion, Frank Armstrong, Marshall & Huschart Machinery Co., Chicago, drove home the point that it is the duty of the distributor to represent the buyer to the builder as well as the builder to the buyer.

Discusses Recession — In attendance throughout the meeting was Lloyd D. McDonald, vice president, Warner & Swasey Co., Cleveland, who is president of National Machine Tool Builders' Association. Introduced by Robert L. Giebel, president, Giebel Inc., New York, who is president of AMTDA, Mr. McDonald expressed his conviction that while the present recession may be along a massive front, it is not destined to be extremely deep. However, the situation is serious enough to demand that both the builders and the dealers make haste to get rid of "the fat between the ears" which both groups accumulated to too great a degree during the lush days which followed the war.

It was voted to hold the 1949 annual meeting, which will mark the 25th anniversary of AMTDA, at Hotel Gibson, Cincinnati, Oct. 30-Nov. 1, 1949.



CIRCULAR FORM TOOLS: A new application of a standard type of circular form tool is paying dividends in increased production at the Sunnyvale, Calif., plant of Westinghouse Electric Corp. The plant's steam turbine manufacture requires many grooved bronze labyrinth seals, whose function is to prevent steam from escaping along the bearing and blade stages of the turbine spindle. Since the seals are bronze, they are extremely abrasive to any tool point. Formerly, whenever the point of one tool was worn or chipped, the whole group of tools had to be removed and new ones substituted. Now circular form tools which can readily be reground and used again are speeding production by as much as 30 per cent

Miners Retire at 60

Lewis-Bridges action adds 8 cents a ton to coal costs. May influence other plans

REDUCTION in the retirement age of coal miners from 62 to 60 under the United Mine Workers welfare program may have far-reaching implications for the coal, metalworking and other industries.

The reduction in retirement age for miners will increase the cost of producing coal by an estimated 8 cents a tons and will necessitate an early increase in the royalty on coal mined. This royalty, now 20 cents a ton, is held by some actuaries to be inadequate to maintain the welfare program on a sound basis. They contend that at a retirement age of 62, a royalty of 41 cents a ton was necessary to maintain the plan. Lowering the retirement age to 60 increases the cost of miners' pensions so that now 49 or 50 cents a ton will be necessary to maintain the plan on a sound basis.

Coal men expect that one of John L. Lewis' demands this summer will be for a sharp increase in the tonnage royalty.

Influences Other Plans—Reducing retirement age for miners is bound to influence union demands on other industries, particularly in the metalworking field. Unions which have been asking for pensions at age 65 may now ask for a lower retirement age.

Roughly the cost in cents per hour of providing a flat pension at age 60 is 50 per cent greater than providing the same amount of monthly pension at age 65. Not only is a greater amount necessary to purchase a retirement annuity starting at 60 greater than for one starting at 65, but the earlier retirement age allows fewer years over which to spread the cost.

How Cost Mounts — Willard A. Weiss, actuary with Eugene M. Klein and Associates, Cleveland, estimates that $14,460 is necessary to purchase $100 a month retirement annuity at age 65, assuming a 2 per cent interest rate, no fringe benefits, and allowing for no administrative expense. At age 62, the same annuity would cost $16,016. At age 60, the cost would be $17,080.

The reduction in retirement age for miners was effected Apr. 7 by Mr. Lewis and Sen. Styles Bridges, the neutral trustee for the welfare fund. Ezra Van Horn, the operators' trustee, opposed the move.

Readers Hail Insurance, Pension Study

INTENSE interest by metalworking executives in social insurance and retirement programs is being manifest by an exceptionally heavy demand for reprints of STEEL's study on "'Insurance and Pension Plans" in the Apr. 4 issue.

This publication has experienced a deluge of letters, telegrams and telephone calls requesting extra copies and, incidentally, complimenting the service rendered through the article.

Excerpts From a Few Communications:

"I have read with considerable interest Walter J. Campbell's article on Insurance and Pension Plans. I would like to get six reprints for our executives. The article is the most concise and up-to-date and gives the greatest amount of information of anything that we have seen . . . . It should be very helpful to the metalworking industries."—*Elmer H. Noelting, vice president, Faultless Caster Corp., Evansville, Ind.*

* * *

"I happen to be one of the few individuals who have devoted their entire time and thought to this subject continuously since the middle twenties and I find this particular article far-and-away the best that anybody has published on the subject and which I have seen in all those years . . . . It is rare indeed that the topic has been approached as a result of the initiative of the employing corporation, nor have many such plans been tempered with the sweet reasonableness with which a successful executive would normally approach a problem involving so great a long-range obligation . . . . Could we obtain 25 or more copies of this publication?"—*Laurence G. Hanmer, manager, pension actuarial department, Joseph Froggatt & Co. Inc., New York.*

* * *

"This is a splendid article and tells the story of pensions clearly yet succinctly . . . . I would like to order 100 reprints."—*C. G. Rodgers, Cleveland.*

* * *

"We are very much interested in obtaining several sets of tear sheets on your very interesting article on Insurance and Pension Plans."—*J. W. Dorsey, Dravo Corp., Pittsburgh.*

* * *

"We find this publication to be not only very interesting but extremely instructive and is probably the best thing we have seen in connection with pension plans . . . . We would like to have six copies."—*William D. Skinner, secretary and treasurer, General Fireproofing Co., Youngstown.*

* * *

"We would like very much to have five copies of Walter J. Campbell's excellent article on Insurance and Pensions Plans in the Apr. 4 issue. We will have to deal with this subject very shortly and believe your article will be most helpful."—*W. M. Cook, Square D Co., San Francisco.*

* * *

"Would it be possible to obtain four copies?"—*Benjamin A. Smith, vice president and secretary. C. O. Bartlett & Snow Co., Cleveland.*

* * *

"Please Have Mailed To Us Today Three Copies STEEL Apr. 4. We Will Be Watching Your Magazine For More About This. Information Given In Your Magazine Will Be Invaluable."—*E. C. Patterson, chairman and treasurer, Chattanooga Boiler & Tank Co., Chattanooga, Tenn.*

* * *

"We declare the article to be absolutely 'must' reading for all management executives of gray iron foundries."—*Special bulletin to members of Gray Iron Founders' Society Inc. by R. L. Collier, executive vice president.*

* * *

"Please mail us four copies of your article on Insurance and Pension Plans."—*W. H. Johnson, vice president, Lone Star Steel Co., Dallas.*

* * *

"Will you please send 15 copies of your Apr. 4 brochure, Insurance and Pension Plans?"—*Copperweld Steel Co., Glassport, Pa.*

* * *

"Kindly send us three copies of the article, Insurance and Pension Plans."—*R. A. Nentwig, purchasing agent, Superior Metal Products Co., St. Paul.*

* * *

A limited number of reprints are still available from STEEL's Reader Service Department.

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Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Air of alertness pervades Pentagon as Louis Johnson makes influence felt. Moves to streamline defense organization. Abolishes some boards. Industrial moblization still problem

THINGS are different these days in the National Military Establishment. The new defense secretary, dynamic Louis Johnson, is making his presence strongly felt—and there is an atmosphere of alertness in the sprawling Pentagon building.

Whether or not he made a tactical error in telling reporters at a news conference that he already has a "fairly firm conviction" as to the correct status of Air Force and Navy in the field of air warfare but will let top Army, Navy and Air Force chiefs attempt to "argue me out of it" is a moot question. Many think Mr. Johnson's direct approach may work out satisfactorily in getting a final adjustment of this controversial question.

Too Many Boards—Mr. Johnson told reporters there are "too damn many" boards and committees—some 800 of them—in the armed services, and that many of them would be abolished or merged. Three days later, as a starter, he announced abolition of nine boards and committees. At the same time he warned top officers—at the Research & Development Board, the Munitions Board, etc.—that they should take steps of their own initiative to simplify their setups, implying that they must do this "or else."

Mr. Johnson told news men that some heads will roll; he said he had told the three secretaries that he had no intention of replacing "the fellows that are doing a job" but that those who would not work for unification "will go."

Stephen T. Early, former White House secretary and more recently a vice president of Pullman Inc., has been appointed under secretary of defense and will outrank the secretaries of the three services.

Reallocates Offices — Since then there have been numerous signs that Mr. Johnson is on the job. He ordered a sweeping reallocation of office space under which all top officers of the three services will be handily located in the Pentagon, and under which the various units will be concentrated together instead of being scattered about in the huge structure. It was a shock when he stated that, subject to approval by the President and Congress, there would no longer be an annual "Army Day," "Navy Day," etc. but, rather, a single annual "Armed Forces Day."

All this probably is to the good; the course Mr. Johnson is following seems effective in putting important military men more noticeably on their mettle.

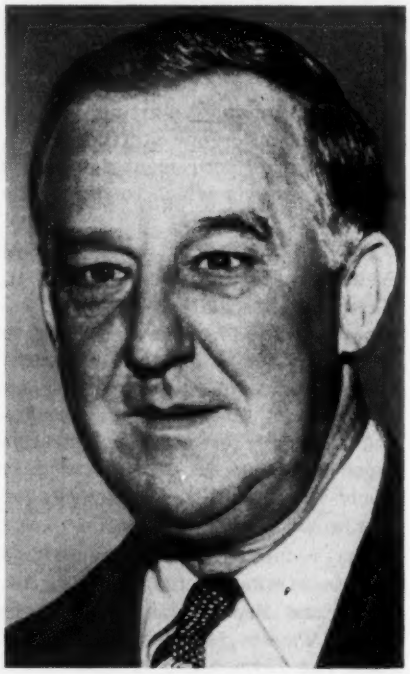
At the same time, it remains to be seen what he will do to remedy a very bad situation in a vital matter, namely, the setting up of an organization which would be the nucleus for organizing the country for war if and when an emergency comes. The plans for such a setup long ago were completed by the National Security Resources Board; what is needed is action that would authorize the creation of at least a token war mobilization organization. What is needed is enactment of standby legislation by Congress providing necessary war powers, and authorizing advance action to pave the way for using them efficiently and immediately in the event of war.

Intolerable Situation—The situation as it stands is intolerable. For one thing, the lack of a course of action prevents the effective preparations that industry could make if it knew definitely what will be expected of it in the event of another war. Industrialists in general know that if another war comes they will be called to Washington in droves to effect industrial mobilization and give life to many limitation, conservation and other orders. It would be a fine thing if they could know now just what authority they would have, what they will be called upon to do, and who will do what.

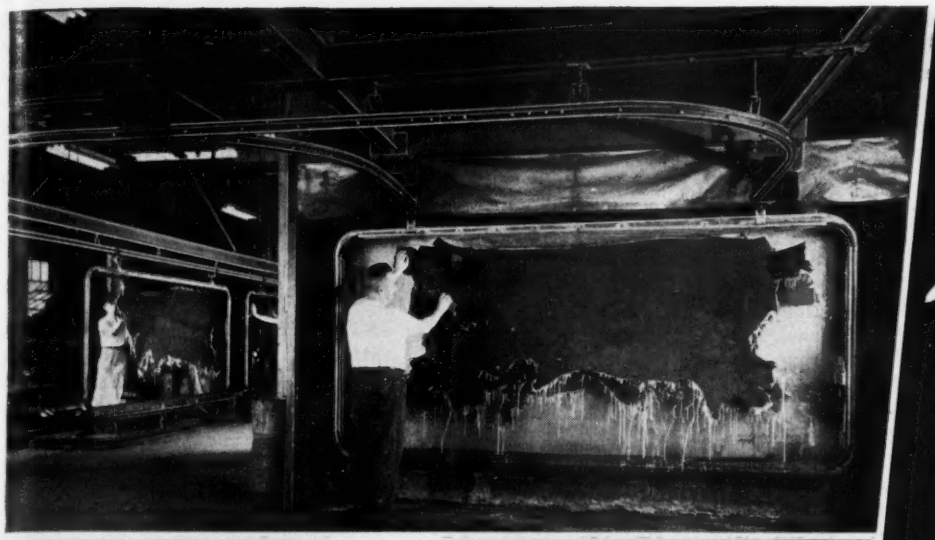
To remedy this deficiency in our security setup Mr. Johnson is in an ideal position. He is a member of the cabinet, secretary of defense, a member of the National Security Council, a member of the National Security Resources Board, etc. Furthermore, he is a civilian and, as such, not associated with any disposition to put mobilization in the hands of the military in event of a war.

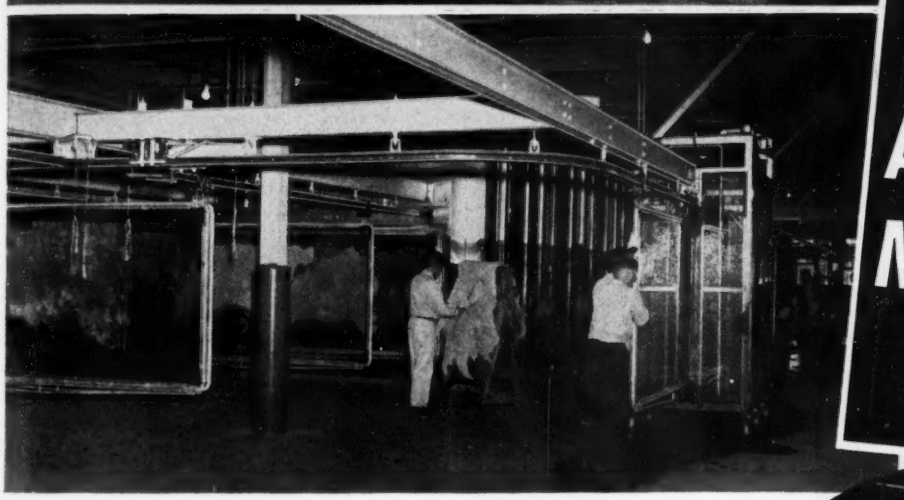
Opportunity for Johnson—If Mr. Johnson fails to take a lead in curing this deficiency in our security setup he will be overlooking a shining opportunity to serve the country. For it is generally agreed that the first secretary of defense, James V. Forrestal, steered very effectively one of the biggest operations in our government—unification of the armed forces. Forrestal did not achieve perfection but he made a remarkable start on a job featured by countless difficulties and lack of precedent. Secretary Johnson can improve on

LOUIS JOHNSON



STEPHEN T. EARLY





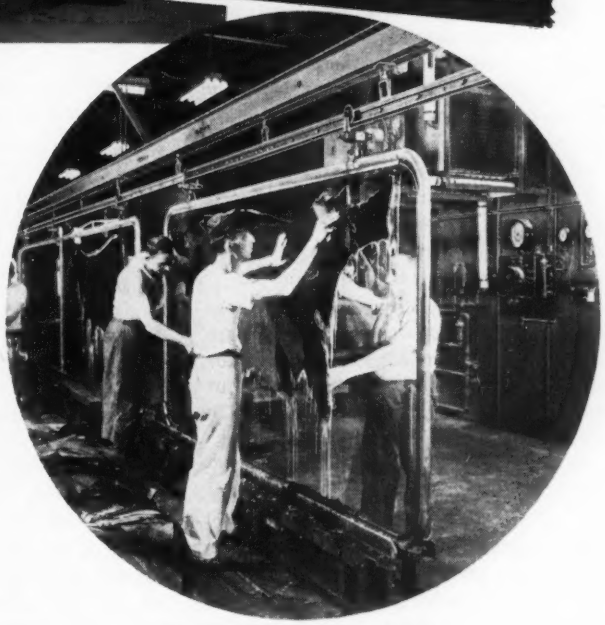
Faster Drying with AMERICAN MONORAIL

Here's a simple MonoRail loop with carriers and "kicker" switches that really speeds up leather drying.

Sides or skins are pasted on glass plates in carrier frames suspended from a MonoRail track; all unnecessary manual handling is eliminated. After the wet leather is pasted on glass, the carrier moves through the dryer without rehandling and the dried leather is stripped from the glass plate for further processing.

An automatic switch transfers the carrier from single to double line travel through the dryer. After the leather has been removed, the carrier is automatically transferred from double to single line travel through the plate washer and pasting stations.

This is just another example of the simplicity of MonoRail application that most economically correlates transfer and processing operations. An American MonoRail engineer can show you how you can increase production and lower costs with American MonoRail Overhead Handling.



Photographs through courtesy of Proctor and Schwartz, Inc.

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Mr. Forrestal's performance; he has a sound foundation on which to build improvements. But the big gap now is to give life to our mobilization planning. That is where Mr. Johnson can shine if he seizes the opportunity.

Patent Regulation Liberalized

A NEW regulation on patents and copyrights which is more liberal toward contractors has been adopted by the Army, Navy and Air Force, effective July 1. Appearing as Section IX, "Patents and Copyrights," Armed Services Procurement Regulation, a new requirement is that inventions involving fissionable material or atomic energy developed during the course of a research and development contract are to be reported promptly to the Atomic Energy Commission which will take charge of the inventions and information concerning them. Otherwise under the new joint regulation, contractors will not have to do as much reporting as hitherto. Copies of Section IX may be had from the Government Printing Office, Superintendent of Documents, Washington 25, D. C., at 10 cents.

Some of the principal features of the new section are:

1. When the government obtains a license under a patent resulting from a research and development contract, it cannot use the license to manufacture or have manufactured material to be supplied to the general public in competition with the contractor or his commercial licensees.

2. If no inventions have been made, or for the first time actually reduced to practice, under a research and development contract, the contractor must so certify to the government.

3. Regulations have been strengthened to give the government more assurance that the price it pays for an article does not include an amount for royalties on a patent on which it already has a license.

4. Considerable leeway is given to the contractor in reporting royalties. He is given the choice of two alternate methods of making such reports depending upon the nature of his accounting procedures. Also, more time is allowed in which to file royalty reports.

5. The patent indemnity clause has been rewritten to provide more safeguards for the contractor and to limit its use.

Mineral Subsidies in Doubt

MEMBERS of the Mines & Mining Subcommittee, House Public Lands Committee, are grumbling over the lukewarm support they are getting from the administration in this year's attempt to enact a minerals subsidy act to stimulate production of strategic and critical minerals through incentive payments. The administration position, given the committee by Secretary Krug, would limit the program to 3 years, would limit the payments to $40 million a year for production and $20 million for exploration, and would give the Interior Department carte blanche in setting prices and policies. In the opinion of interested western legislators, this is entirely unsatisfactory. Chances are that a bill will not be reported out until May or June.

In the meantime the two Armed Services Committees are holding up action on their manganese bill to see what the House Public Lands Committee comes up with for minerals generally.

The manganese bill calls for encouragement of domestic production by means of a stockpile procurement program involving 4 million long tons of metallic manganese. Price per ton would be $1 per unit of manganese for ore containing 15 per cent manganese, plus 2 cents for each additional unit contained. The schedule of prices, as prepared by Rep. Wilbur D. Mills (Dem., Ark.), sponsor of one of the bills, H. R. 2767, is shown in accompanying box.

Manganese Ore Prices

Percentage of manganese content in ore	Price per unit of manganese	Price per long ton of ore	Price per pound of manganese contained in ore
15	$1.00	$15.00	$0.0446
16	1.02	16.32	.0455
17	1.04	17.68	.0465
18	1.06	19.08	.0473
19	1.08	20.52	.0482
20	1.10	22.00	.0491
21	1.12	23.52	.0500
22	1.14	25.08	.0509
23	1.16	26.68	.0518
24	1.18	28.32	.0527
25	1.20	30.00	.0536
26	1.22	31.72	.0545
27	1.24	33.48	.0553
28	1.26	35.28	.0562
29	1.28	37.12	.0571
30	1.30	39.00	.0580
31	1.32	40.92	.0589
32	1.34	42.88	.0598
33	1.36	44.88	.0607
34	1.38	46.92	.0616
35	1.40	49.00	.0625
36	1.42	51.12	.0634
37	1.44	53.28	.0643
38	1.46	55.48	.0652
39	1.48	57.72	.0661
40	1.50	60.00	.0670
41	1.52	62.32	.0679
42	1.54	64.68	.0687
43	1.56	67.08	.0696
44	1.58	69.52	.0705
45	1.60	72.00	.0714
46	1.62	74.52	.0723
47	1.64	77.08	.0732
48	1.66	79.68	.0741
49	1.68	82.32	.0750
50	1.70	85.00	.0759
51	1.72	87.72	.0768
52	1.74	90.48	.0777
53	1.76	93.28	.0786
54	1.78	96.12	.0795
55	1.80	99.00	.0804
56	1.82	101.92	.0813
57	1.84	104.88	.0822
58	1.86	107.88	.0830
59	1.88	110.92	.0839
60	1.90	114.00	.0848
61	1.92	117.12	.0857
62	1.94	120.28	.0866
63	1.96	123.48	.0875
64	1.98	126.72	.0884
65	2.00	130.00	.0893
100	2.70	270.00	.1205

Note basis of long tons—unit of manganese 22.4 pounds.

Admiral Braine to Retire

INTERESTING to industry is the retirement, on May 1, of Rear Adm. Clinton E. Braine Jr., assistant chief and director of naval material and assistant chief and director of the Navy's Production Policy Division. He will be succeeded by Rear Adm. Rico Botta, now serving as fleet aircraft maintenance officer of the Atlantic Fleet.

Verity Adviser to SCAP

CALVIN VERITY, former executive vice president and general manager, Armco Steel Corp., Middletown, O., and who retired from the steel business last year, has accepted an appointment to the Supreme Commander Allied Powers, Japan (General Douglas MacArthur), as industrial adviser to SCAP and director of industrial production and public utilities, Economic and Scientific Section.

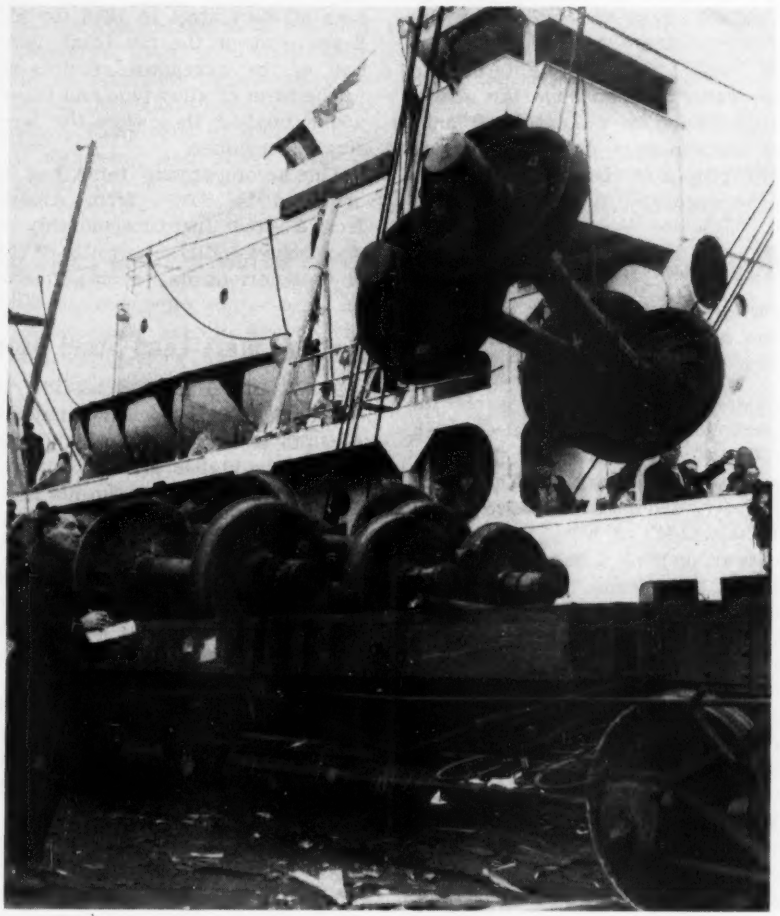
RFC Loan Applications Mount

LOAN applications received from industry by the Reconstruction Finance Corp. continued to mount in number and total dollars involved, with favorable action taken on one out of every three applications on the average, while the total dollars loaned run around 8 per cent of the dollars asked by prospective borrowers. RFC it will be recalled, grants worthy loans which are not obtainable from private sources of capital.

February's statistics are: 790 applications for $444,600,000 and 259 loan approvals for $35,500,000.

Water Development Program

THE President's signature of the act confirming the 5-state Upper Colorado River Basin Compact opens the way for the federal government to proceed with long-planned development of water resources in Utah, Wyoming, New Mexico, Colorado and Arizona. As part of a development program that will take decades to complete, the Interior Department has submitted preliminary proposals and later on will ask Congress for authorization and appropriations to cover 12 specific upper basin projects. The main ones involve storage reservoirs and dams for irrigation.



ROLLING STOCK FOR FRANCE: Axles and wheels, part of 1500 disassembled box cars bought by the French state railways in the United States with Marshall Plan funds, are unloaded from freighter at Cherbourg. Orders for box cars, each of 20 tons capacity, totaling 26,750 units have been placed by France. NEA photo

Steel Paces European Recovery

Production during last 1948 quarter in all ERP nations but Germany exceeds by 6 per cent the average quarterly output in 1937, the best prewar year

STEEL industry is setting the pace for the industrial recovery of Marshall Plan nations, Economic Cooperation Administration reports in reviewing Europe's production record after one year of U. S. assistance.

Output for 1948 totaled about 44 million net tons, 30 per cent more than in 1947. For the last quarter of 1948, output was at an annual rate of 47 million tons, a postwar high, and only 6 per cent below the 1935-1938 average of the participating countries. Excluding the output of Western Germany, production of the remaining participants at the end of 1948 was about 6 per cent above the quarterly average of 1937, the best prewar year. ECA estimates that the aid program will provide a finished steel production of about 48.7 million net tons within the participating countries in 1952-53, as compared with the 1935-1938 average of 36.6 million tons.

About $3.1 billion will be invested in iron and steel production facilities by 1952-53. Of this amount, about $600 million are required for imported materials and equipment, of which about $400 million will come from the U. S. Import needs for 1949-50 are estimated at about $140 million, of which $110 million will be spent in the U. S.

French iron and steel output in 1948 was 31 per cent above 1947. Production of the United Kingdom increased 17 per cent in 1948 over 1947. While output of Western Germany was still low as compared to prewar years, production climbed and during the final quarter of 1948 it was more than double that in the first quarter of 1947, and for the year as a whole it was 82 per cent above 1947. Belgium's output last year was up 35 per cent.

France

MAJOR steel expansions in France include two new strip mills, two electric furnaces and two open-hearth units. One strip mill, in northeastern France, is under construction, while the other is still in the planning state. A 1.5-ton electric furnace has begun operations at Acieries et Usines de Sambre et Meuse where a larger 12-ton unit will be in production by the end of the year. At Neuenkirchen in the Saar, the first new open-hearth furnace built since the war is now operating; a second unit will be started soon.

French steel production is increasing, but foreign demand has also risen as the result of government relaxation of export restrictions. Consequently, delivery times are extended again. Consumers of merchant steel can expect shipment at any time up to 10 months, from 3 to 6 months for structurals, from 6 to 12 months for plates, from 3 to 9 months for sheets, from 6 to 8 months for plain annealed wire and 12 months for galvanized wire. Output of pig iron in February was 663,000 metric tons; of steel ingots and castings, 720,000 tons. Sales of French and Saar pig iron are now handled by a new organization, Societe Commerciale des Fontes.

Great Britain

THE STEEL produced during 1949 in Great Britain which exceeds the 1948 output will probably go to British capital re-equipment, government announcements indicate. No Labor spokesmen have held out much hope for more domestic consumer goods, and 1949 export quotas remain almost the same.

In the field of exports, producers are worried about the subsidy loss which necessitates price rises in the face of steel price declines or at least stable quotations from all of Britain's competitors. United Kingdom prices, however, are still below world levels. Subsidies continue on imported finished steel and imported pig iron.

The steel nationalization bill has now passed through the committee stage in the House of Commons. Numerous sniping attacks on the measure by the opposition have finally been quieted, but the bill has

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been considerably revised in the process. One new provision seeks to assure steel consumers that they will not be discriminated against when the industry is nationalized. It sets up an Iron & Steel Consumers' Council to look after users' interests. The council will consist of a chairman to be appointed by the government and not more than 20 other members appointed by the government after consultation with representatives of consumers, dealers and two members from the corporation which will administer the publicly owned steel industry. The bill, as amended, will soon be presented for a third reading. If passed by the Commons, which now appears likely, the measure will go to the House of Lords, where another long delay is expected.

Western Germany

BIZONIA, which turned out a postwar record of 750,000 metric tons of steel in March, is not expected to produce more than 8.5 million tons this year, although the official ceiling has been set at 10.7 million tons.

To achieve this maximum output, the industry estimates $201,450,000 will have to be invested to repair equipment and modernize. Of this total, $67.5 million is available from depreciation funds and about $1.7 million from undistributed profits. The rest would have to come from the outside, with ERP counterpart funds seen as the most likely source. Capital expansion and rehabilitation requirements of all Bizonia industries, including public building and housing, are estimated at $2.4 billion for the next 18 months.

Of most immediate interest to Ruhr industry regarding the Allied announcement on relaxation of military controls over Western Germany is the provision that dismantlings will be discontinued.

Alloy Distribution

Pattern in 1948 gives emphasis to auto industry which took one-third of all mill shipments

AUTOMOBILE builders were the largest users of alloy steel in 1948, leading all other market classifications by a wide margin. The industry received about one-third of all mill shipments of alloy steel during the year, getting 1,589,729 tons.

About two-thirds of the automakers receipts were hot-rolled bars which totaled 1,043,717 tons and were equal to more than half of mill shipments of this product. More than half of the hot and cold-rolled high strength-low alloy sheets shipped by the mills in 1948 also were received by the automobile builders.

Next in line from the standpoint of total tonnage were the machinery, industrial equipment and tools classification and electrical machinery and equipment classification which received 470,026 tons and 481,674 tons, respectively. These two groups each accounted for approximately 10 per cent of alloy steel mill shipments in 1948.

Warehouses accounted for 377,818 tons of alloy steel in 1948 for about 8 per cent of the net total. Almost half of the warehouse receipts were in the form of alloy pipe and tubes, of which product they were the largest single consumer.

The accompanying table has been compiled by STEEL from American Iron & Steel Institute monthly data and shows mill shipments of alloy steel to various market classifications.

Auto Makers Lead Steel Users

CONTINUING as the leading steel consumer, the automotive industry's receipts from steel mills in January, 1949, were higher than in any month of 1948. According to figures just released by the American Iron & Steel Institute, the auto industry received 946,368 net tons in January, constituting 16.4 per cent of the month's total mill shipments of 5,761,959 tons.

Construction and maintenance placed second in steel receipts for January, aggregating 676,289 tons or 11.7 per cent of total mill shipments. Rail transportation with 449,359 tons and containers with 437,218 tons followed.

Jobbers, dealers and distributors received 981,371 tons or 17 per cent of all mill shipments in January, 1949. This total surpassed receipts of 924,650 tons in January, 1948, but was down slightly from the more than 1 million tons allotted by the mills in December, 1948.

Carbon grades accounted for 5,-

DISTRIBUTION OF ALLOY STEEL PRODUCT

Mill shipments in net tons. Table compiled by STE

	Ingots, Blooms, Billets, Slabs, Sheet Bars, Seamless Tube Rounds	Plates	Hot-Rolled Bars	Cold-Finished Bars	Tool Steel	Oil Country Goods	Mechanical Tubing	Pressure Tubing	Total ‡ Pipe and Tubes	Dr W
Converters and Processors	131,556	10,243	251,909	7,544	1,712	6,367	8,092	4,366	18,844	2
Forgings (except automotive)	222,576	577	102,419	813	451	.....	.....	.....	.....	
Bolts, Nuts, Rivets, Screws	330	7	31,431	10,945	340	.....	.....	.....	.....	14
Jobbers, Dealers, Distributors	4,306	4,413	94,330	22,124	11,613	150,675	6,682	4,124	164,634	
Construction and Maintenance	6,728	5,649	10,699	612	142	3,823	10,737	10,865	28,530	
Contractor's Products	3,743	1,829	7,412	198	32	24	163	1,608	1,813	
Automotive	79,096	5,361	1,043,717	61,065	1,288	.....	5,060	47	5,107	1
Rail Transportation	3,471	11,845	24,994	1,526	63	73	832	715	1,620	
Shipbuilding, Marine Equip.	886	2,978	8,871	676	43	.....	147	4	151	
Aircraft	2,783	1,995	3,983	1,321	13	.....	1,631	56	1,687	
Oil and Gas Drilling	33,648	77	75,211	3,502	1	49,410	875	884	51,177	
Mining, Quarrying, Lumbering	1,485	1,515	7,768	1,275	557	82	11	.....	93	
Agriculture	2,500	1,591	26,719	5,152	45	.....	210	153	363	
Machinery, Indus. Equip. Tools	25,359	11,157	172,452	55,099	6,925	1	100,281	5,175	105,464	
Electrical Machinery, Equip.	3,273	765	9,645	1,937	221	.....	41	14	61	
Appliances, Utensils, Cutlery	.....	101	1,077	1,073	18	.....	35	2	37	
Other Domestic, Comm. Equip.	27	130	3,785	3,777	289	.....	6	.....	6	
Containers	1,599	6,131	654	138	.....	.....	154	.....	6,061	
Ordnance, Other Military	—889	80	2,619	132	23	.....	283	.....	283	
Export	5,431	782	30,382	948	1,716	20,950	537	1,174	22,797	
Unclassified	64,898	1,583	173,830	44,921	43,895	†	†	†	18,293	
Total	592,806	68,809	2,083,907	224,778	69,387	231,406	135,777	29,187	427,021	
*Less shipments to members of industry for conversion	102,647	8,731	222,534	7,302	1,458	5,839	2,103	3,371	11,332	
Net Total	490,159	60,078	1,861,373	217,746	67,929	225,567	133,674	25,816	415,689	

*All of these shipments were made to group classified as "Converters and Processors." † Included in total pipe and tubes column. ‡ Also includes miscellaneous tubular products.

294,377 tons of total January shipments, alloy (other than stainless) 437,911 tons and stainless 29,671 tons. In January, 1948, total mill shipments of 5,410,438 tons were comprised of 5,010,539 tons of carbon grades, 376,958 tons of alloy (other than stainless) and 22,941 tons of stainless.

Tool Sales Courses Slated Again

FOUR summer sales conferences, designed expressly as refresher courses in sales engineering for the machine tool industry, were announced last week by L. D. McDonald, president, National Machine Tool Builders' Association, in co-operation with Cornell University, Western Reserve University, Dartmouth College and Purdue University.

The conferences are an expansion of the program started last year, when a single course, limited to 50 men, was presented at Cornell University in July. It was the first course of its kind ever devoted exclusively to sale of capital goods equipment.

Name Program Committees — As last year, the National Machine Tool Builders' Association and the American Machine Tool Distributors' Association have each named a committee jointly to develop the program, which is to be the same at each conference.

The dates are as follows: Cornell University, Ithaca, N. Y., July 11 to 16; Western Reserve University, Cleveland, July 25 to 30; Dartmouth College, Hanover, N. H., Aug. 8 to 13; Purdue University, Lafayette, Ind., Aug. 15 to 20.

The conferences are open only to sales managers, district managers and salesmen who are employees of members of the National Machine Tool Builders' Association or the American Machine Tool Distributors' Association.

The curriculum will be based on the lectures, problems and discussions during the course at Cornell in July, 1948, and on a textbook which is being published at this time by Prof. Harry J. Loberg, who is in charge of the conferences. Professor Loberg is head of the Industrial and Administrative Engineering Department, College of Engineering at Cornell.

A faculty of resident professors will be selected at each of the host universities, co-operating with members of the industry under the general direction of Professor Loberg.

Calendar of Meetings

Apr. 18-20, Open Hearth Steel Committee and Blast Furnace, Coke Oven and Raw Materials Committee, Iron & Steel Div., AIME: 32nd annual conference, Palmer House, Chicago. Institute headquarters are at 29 W. 39th St., New York.

Apr. 18-20, Illinois Institute of Technology: Eleventh annual Midwest power conference, Sherman Hotel, Chicago.

Apr. 19-20, Magnesium Association: Annual spring meeting and product exhibit, Edgewater Beach Hotel, Chicago.

Apr. 19-21, American Institute of Electrical Engineers: Southwest district meeting, Baker Hotel, Dallas.

Apr. 21-22, Society for Advancement of Management and American Society of Mechanical Engineers: Fourth annual time study and methods conference, Hotel Statler, New York.

Apr. 25, International Acetylene Association: Meeting, Hotel William Penn, Pittsburgh. Association headquarters are at 30 E. 42nd St., New York.

Apr. 25-27, Radio Manufacturers Association and Institute of Radio Engineers: Fourth annual spring meeting, Benjamin Franklin Hotel, Philadelphia.

Apr. 25-27, Triple Mill Supply Convention: Meeting headquarters at Hotel Cleveland. Cleveland; exhibit at Public Auditorium. Convention sponsored by American Supply & Machinery Manufacturers' Association and National and Southern Supply & Machinery Distributors' Associations.

Apr. 26, American Ordnance Association: 31st annual meeting, Hotel Ambassador, Los Angeles. Los Angeles committee has as its secretary Evan White, 2700 Tweedy Blvd., South Gate, Calif.

Apr. 26-27, Westinghouse Electric Corp.: Annual machine tool electrification forum, Statler Hotel, Buffalo.

May 2-4, American Society of Mechanical Engineers: Spring meeting, Mohican Hotel, New London, Conn.

May 2-5, American Foundrymen's Society: Foundry congress, St. Louis. Society headquarters are at 222 W. Adams St., Chicago.

May 5-6, Rail Steel Bar Association: Annual meeting, Edgewater Beach Hotel, Chicago. Association headquarters are at 38 S. Dearborn St., Chicago.

May 9-12, American Mining Congress: Coal convention and exposition, Public Auditorium, Cleveland.

May 13, American Institute of Electrical Engineers: Conference on electric equipment for materials handling bridges, Hotel Cleveland, Cleveland.

BY MARKET CLASSIFICATION DURING 1948

rom American Iron & Steel Institute figures.

Hot-Rolled Sheets	Cold-Rolled Sheets	Electrical Sheets and Strip	Hot-Rolled Strip	Cold-Rolled Strip	High Strength—Low Alloy: Bars	Plates	Structural Shapes	Hot-Rolled Sheets	Cold-Rolled Sheets	Hot-Rolled Strip	Cold-Rolled Strip	All Other	Total Alloy (Except Stainless)	Per Cent
,081	423	256	14,105	1,963	736	367	105	3,128	951	249	6,151	2,131	456,020	1.70
.....	.....	.....	.....	.....	129	.....	42	.....	.....	.....	.....	397	327,422	6.99
13	14	.....	26	28	180	98	.....	95	194	.....	.....	32	57,933	2.44
,810	8,263	9,650	1,364	903	8,505	10,942	5,413	14,791	6,497	2,527	193	1,229	377,818	8.07
,959	293	149	130	95	3,688	12,427	6,764	12,064	3,022	13,820	428	132	107,331	2.29
,519	2,921	1,026	592	687	973	3,380	210	18,050	6,924	4,619	1,183	....	68,137	1.45
,005	4,350	7,665	5,057	1,445	3,772	20,352	6,199	134,855	155,844	29,295	14,190	131	1,589,729	33.96
992	83	5,894	1,619	31	4,604	72,484	27,666	59,452	9,021	2,734	660	3,198	232,231	4.96
28	.....	26	.....	1	313	4,435	594	1,470	161	.....	.....	312	20,945	0.45
935	182	499	15	200	.....	103	.....	283	47	.....	143	43	14,408	0.31
412	81	18	369	.....	1,606	190	661	104	74	.....	.....	480	167,611	3.58
346	156	505	43	87	1,052	4,973	846	3,787	131	.....	.....	419	25,038	0.53
,098	730	350	12,306	7	3,142	1,671	1,241	9,238	1,897	397	96	72	68,668	1.47
,015	327	3,260	9,404	1,437	9,370	24,724	12,289	14,669	4,475	147	1,048	1,554	470,026	10.04
,227	53,203	353,329	2,475	20,150	1,348	1,290	164	2,248	896	363	58	2	481,674	10.29
,098	1,758	22,693	82	4,153	182	729	620	1,611	11,061	142	894	3	47,344	1.01
303	1,688	4,516	.....	2,810	143	566	234	4,754	15,244	814	7,356	....	46,447	0.99
,179	6	232	519	.....	62	227	25	7,632	1,295	274	.....	....	26,057	0.56
21	4	103	.....	83	7	138	11	223	232	.....	.....	....	3,070	0.07
,177	1,049	22,847	111	988	1,584	6,096	1,680	3,102	3,220	.....	142	73	108,191	2.31
,256	4,057	.....	931	632	.....	.....	15	.....	.....	.....	.....	574	361,854	7.73
,474	79,588	433,018	49,148	35,700	41,396	165,192	64,779	291,556	221,186	55,381	32,542	10,782	5,057,954	100.00
726	116	.....	11,794	1,391	582	178	105	1,967	17	84	2,580	1,544	376,160	
,748	79,472	433,018	37,354	34,309	40,814	165,014	64,674	289,589	221,169	55,297	29,962	9,238	4,681,794	

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UNIT OF NATIONAL STEEL CORPORATION

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Automakers translating increased steel tonnage into greater production of new motor cars. Many plants establish postwar assembly records in March. Labor unrest increases

DETROIT

WHEN Walter S. Tower, president of American Iron & Steel Institute, told members of Detroit's Economic Club last week that the "question of steel supply is no longer vexing your leading industry" he could not have uttered truer words, as attested by production statistics from practically every manufacturer. What many of his listeners did not realize, however, was the steel industry's completion of additional and improved facilities yielding a 60 per cent increase in hot-rolled sheet and strip, a 160 per cent increase in cold-rolled and a 125 per cent increase in production of cold-finished bars, all compared with prewar capacities. As the leading consumer of these types of finished steel, the automotive industry could not help but be impressed by their greatly improved availability.

A few samplings show how the motor car manufacturers are translating additional steel tonnage into finished cars. March, for example, was the greatest production month in the history of Studebaker, with 26,897 cars and trucks built, up 5500 from February and 3800 higher than the best previous month. Current assemblies are bettering 6000 weekly.

Packard Sets Record—Packard deliveries to customers last month were 11,594, a new postwar record. The total brought the first quarter of the year to 55 per cent ahead of the same period in 1948. Sales were described as strong in smaller towns and rural areas, spotty in metropolitan centers, reflecting the financial strength and optimism of people in smaller communities. Renewed emphasis by Packard on improving its penetration of the market in smaller communities might logically be expected, since this has been one of its weak points in the overall sales picture. Production of Golden Anniversary model Packard started last Wednesday, two days behind schedule because of delays in receipt of new bodies from Briggs where a short walkout interrupted operations the week previous.

Hudson Sales Up—Hudson sales in the last ten days of March jumped 10 per cent above the average of the first two ten-day periods, encouraging sales officials to conclude the expected spring rush of buyers is materializing. Production for the first quarter was 50 per cent better than a year ago, although in the past month there have been frequent interruptions because of equipment breakdowns, shortages of engine blocks and labor disputes. One day was lost last week when it became necessary to rearrange equipment in the paint department. The suspension drew immediate staged protests by UAW-CIO employees at the plant over their inability to get a regular full-week's work or to collect compensation for the idleness periods.

Buick on Two Shifts—Buick assembly lines have gone to two shifts, boosting weekly output to nearly 8000. March output was 31,355, of which 82 per cent were equipped with torque-converter transmissions. Nearly 140,000 of these transmissions have been built since it was started 14 months ago, a remarkable production achievement considering the complicated and precision nature of the device. Within the next four months Buick will introduce its new special series, with entirely new body design which later will be adapted to Cadillac and Oldsmobile models for 1950.

Chevrolet at Postwar Peak—Chevrolet reports the heaviest production for the postwar period in March, the 125,923 units built including 40,831 trucks which constituted an all-time high. Checks on retail deliveries showed 33,804 trucks moved for the month, 10 per cent better than the previous all-time peak set 11 months ago. This appears to refute or at least moderate frequent reports of increasing softness in the truck market, although most of Chevrolet's commercial units are in the lighter weight classifications where slowing of sales has not been as pronounced as in the heavier types.

Shorter Cars Rushed—Chrysler Divisions have returned to the assembly level prevailing before model changes and should move into higher ground directly. Short wheelbase Dodge and Plymouth models are being rushed into production, the latter carrying a Detroit delivered price of $1295 in the three-passenger coupe design.

Ford Keeps Pace—Ford and Mercury schedules are keeping pace with increases projected for this month and the next two, weekly volume exceeding 26,000.

Hit by Supplier's Strike — Nash lines have been holding to the best pace since before the war, although a snag developed last week as an outgrowth of a strike at Bendix Products in South Bend, Ind., supplier of brake shoes. Stoppage at Nash Milwaukee and Kenosha, Wis., plants was in prospect Thursday unless some means for resuming shipments of brakes could be worked out. The Bendix plant employs 7500 who walked out Apr. 7 in protest over a claimed speed-up and the firing of 47 men. The management last week filed suit in Federal Court asking $560,000 damages from the UAW-CIO local, plus an additional $150,000 for each day the work interruption continues. According to company sources, the walkout was of the "wildcat" type, unsanctioned by the International Union headquarters. Employees in the brake shoe division

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1949	1948
January	445,092	422,236
February	443,734	399,471
March	543,927*	519,154
April		462,323
May		359,996
June		454,401
July		489,736
August		478,186
September		437,181
October		516,814
November		495,488
December		514,337
12 mos.		5,549,323

* Preliminary.

Estimate for week ended:

	1949	(Same week) 1948
Mar. 26	121,341	107,284
Apr. 2	119,088	105,132
Apr. 9	130,197	103,004
Apr. 16	132,000	104,761

Estimated by Ward's Automotive Reports

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UNIVERSITY OF MICHIGAN LIBRARIES

NEW LIGHT CAR: Del Mar Motors Inc., San Diego, Calif., is starting production on its new 4-cylinder auto, the Del Mar, which will sell for $1170 f.o.b. San Diego. Powered by a 63-horsepower engine mounted in the front, the car is capable of a speed of 80 mph with a yield of 30 miles to the gallon of gasoline. Assembly plants are planned at Fort Worth, Tex., Chicago and Philadelphia. NEA photo

were earning an average of $1.81 hourly.

Labor Disturbances Increase

ON THE eve of Ford's contract talks with UAW, a wave of minor disturbances, accompanied by a considerable degree of vocalizing on assorted c o m p l a i n t s, is sweeping through many motor plants and parts companies. It is difficult to tell whether they have been engineered to pep up the boys or whether they are just a coincidence. Even at the Ford Rouge plant there are mutterings of a strike vote in the assembly department where there has been a lot of grumbling over company efforts to "freeze" speeds of conveyor lines.

Exchange of correspondence between union and Ford officials, which usually precedes the formal contract negotiations and which is always released to the press, sometimes before it is received by the addressees, is proceeding on schedule. The latest is a few thousand words from UAW president Walter Reuther addressed to John S. Bugas, Ford industrial relations vice president. Reuther attacks the company's earlier contention that it cannot pay pensions and other security demands without being placed at a competitive disadvantage. His line of argument is that if the company can afford to pay pension costs for top executives then it can do likewise for the men on the line.

Mr. Reuther's rhetoric is good: "American industry cannot escape the necessity, nor the responsibility, of meeting the problem of security for workers who are too old to work, but too young to die." His logic is often corny: "The Ford Motor Co. stands today as the world's largest family-owned industrial empire which was financed almost entirely out of earnings made possible by the toil and sweat of tens of thousands of Ford workers."

New Light Car Launched

A 4-CYLINDER passenger car to be known as the Del Mar, built in a 5-passenger two-door sedan model, is slated to go into production this month according to news releases from its progenitor, the Del Mar Motors Inc., San Diego, Calif., through Arthur D. Cooksey, board chairman. He states it will be priced at $1170, f.o.b., will be built up of standard nationally-known parts, powered by a 63-hp Continental engine mounted in front. His ambitious plans call for assembly plants to be erected in Chicago, Philadelphia, and Fort Worth, and eventually in Europe. Private capital backing the enterprise has not been disclosed.

There have been perhaps a dozen or so projects of this type launched since the war and none appears to have progressed much beyond the promotional stage. The feeling around Detroit is that the golden opportunities in the field for new car manufacturers probably have passed. Already the market is gravitating back to the big three. General Motors in March, for instance, accounted for 42 per cent of total industry production, and its schedules are still pointing upward. No one can b censured for an effort to crash th gate, for the industry has alway welcomed competition — gentle o rough. However, the gravy train o 1945-49 has pulled into the station.

Briggs' Volume Up

BRIGGS Mfg. Co., largest independent body manufacturer and the source for a large share of Chrysler Corp., Packard and Willys-Overland bodies, has just released its report for 1948 and, as expected, sales volume was at an all-time high of about $266 million, up $61 million from 1947. Profits were up about $4 million equivalent to 3.9 per cent on income. Employment is close to 30,000 and trending upward. Despite the high production last year, some 11 million man-hours were lost through work stoppages and absenteeism in Briggs and its suppliers' plants. Briggs total purchases from 3300 vendors and suppliers in 40 states exceeded $166 million.

GM Launches Product Show

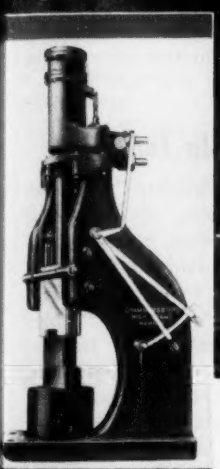
GENERAL Motors' big Detroit product show was launched with all the fanfare and expert promotional technique the corporation has at its command, duplicating on a much broader scale the Waldorf-Astoria extravaganza in New York earlier this year. Receptions and previews brought thousands of business leaders together with corporation officials who, to a man, beamed nothing but unabounded optimism. Estimates indicated something like half a million visitors would attend the showing at Convention Hall before the week was out, and the first few days' count verified the outlook.

The general public is definitely automobile-minded and an exhibition of this magnitude and ingenuity draws enormous crowds, particularly when it is for free. For its part, GM was inspired to go all-out, since it had not had the chance to display its wares since the last National Automobile Show in 1940. As a result, there were a lot of new developments to show, not usually the case when new cars are displayed publicly at yearly intervals.

Bricker Becomes Consultant

M. L. BRICKER, Ford vice president and head of the general production, and first employed by the late Henry Ford in 1904, is relinquishing his duties to become consultant on special projects and problems, continuing as a director, vice president and member of the policy committee.

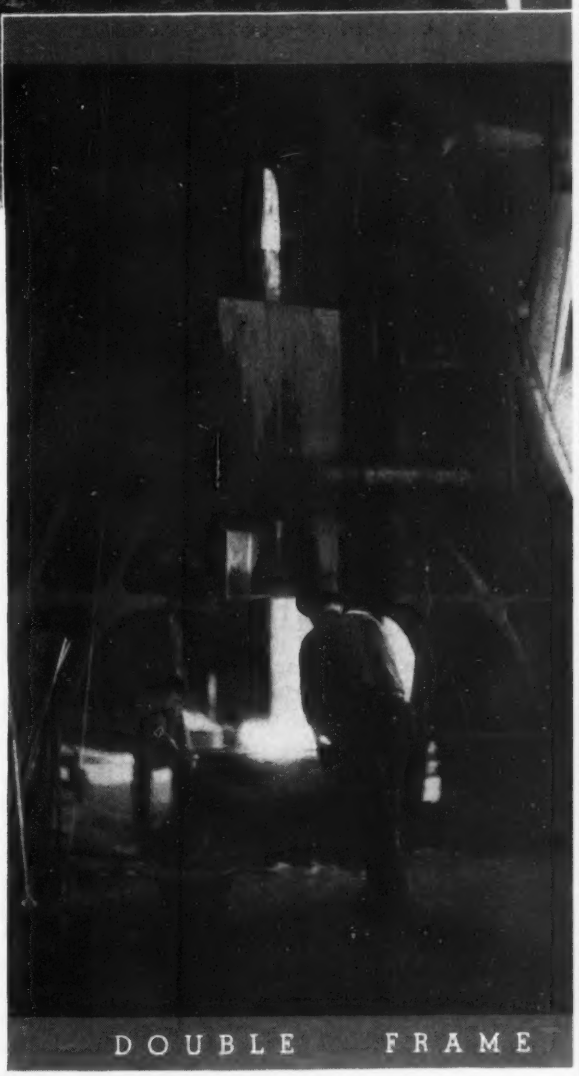
CHAMBERSBURG



SINGLE FRAME

MODEL "L" FLAT DIE FORGING HAMMERS

Greater economy from new automatically lubricated small-bore cylinder and differential valving; more production on heavier anvil. Have you checked on these Model "L" hammers?



DOUBLE FRAME

CHAMBERSBURG ENGINEERING CO. CHAMBERSBURG Builders of IMPACT Machines CHAMBERSBURG, PA.

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New Open Hearth

Being built by Granite City for $1.5 million will have annual ingot capacity of 125,000 tons

GRANITE City Steel Co. will start construction immediately on a $1.5 million open-hearth furnace that will provide an additional annual ingot production capacity of from 100,000 to 125,000 ingot tons. The furnace is expected to be in operation by the end of next November. Present annual output of the open-hearth shop is 300,000 tons.

Equipment for the new unit is to be obtained from Rust Furnace Co., Pittsburgh. It will be the fourth furnace of its type for Granite City's plant and is to be used in the production of carbon steel ingots.

The additional facility is a continuation of the modernization program launched by Granite City in 1946. Up to the first of this year about $20 million had been spent in the overall improvements. Previous projects have included a continuous strip mill, various units for the annealing department, a tempering mill, pickling and shearing lines and an electrolytic cleaning line.

Hupp Adds to Product Line

HUPP Corp., Cleveland, announces the addition of transmission drives and other products for use in the agricultural industry to production of gears at its Chicago plant. The company also revealed that additional products will be manufactured at its Cleveland plant for the automotive and refrigerator industries.

Hupp states that this manufacturing expansion is possible largely because of expenditure of over $400,000 during the past two years in research and product development. Sales at the Cleveland and Chicago plants increased 27 per cent in 1948, as compared with 1947. The company will sell its Detroit plant which during and since the war had been engaged in contract machining work.

Operations during 1948 showed a loss of $380,228, the major portion of which resulted from the Detroit plant which was closed during the year.

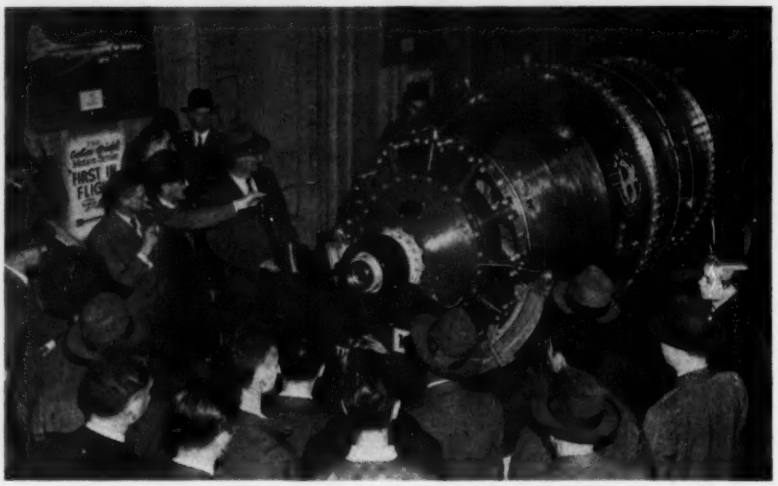
Bucyrus-Erie Modernizes

BUCYRUS-Erie Co., South Milwaukee, Wis., producer of excavating machinery and related apparatus, spent more than $2.9 million in 1948 on a plant expansion program which will be completed early in 1950.

At South Milwaukee a new 20-ton open-hearth furnace will be in operation this month and a new office building and a receiving building are about ready for occupancy. At Evansville, Ind., additional buildings, having 70,000 sq ft of floor space, and the installation of new equipment are substantially completed. These facilities provide more capacity for machining, structural, erecting, tool room and material storage facilities. A new Evansville office building was occupied early last month. At Erie, Pa., modernization of the iron foundry, begun a year ago, will be completed this summer.

Enginering work last year included perfecting a hydraulic dipper control for tractor dozer shovels, development of a new water well drill, redesign of truck-mounted cranes discontinued during the war, and redesign of dippers to increase the size 10 per cent in some cases.

Company's net earnings in 1948 were $5,823,962 on sales of $69,132,978. Sales in 1948 were 22 per cent in excess of those of 1947 which were then the highest in the firm's history.



TURBO-PROP ENGINE: Interested spectators look over the new Curtiss-Wright turbo-prop engine on display at the Indoor Air Show at New York's Hotel Commodore. Claimed to be the most powerful turbo-prop engine yet built, the unit could support a B-29 in flight. NEA photo

Pittsburgh Steel May Expand

EXPANSION plans under consideration by Pittsburgh Steel Co. for completion within the next few years involve an expenditure of at least $12 million.

The program would include: Installation of an electrically driven blooming mill at Monessen, Pa., to replace the three-high, steam-driven unit built in 1908; rod and wire mill improvements at Monessen; and improvements to tube mills and finishing departments at the Allenport, Pa., plant. The company also plans to purchase iron ore reserves.

Sperry Volume Up for 1948

SWORDS and plowshares boosted shipments for Sperry Corp., New York, about 60 per cent in 1948 over 1947 as government rearmament contracts swelled and farm machinery sales gained.

In the former category, instrumentation and control apparatus shipments to the Armed Forces and new government development projects were substantially increased in 1948 over 1947, and indications are that these shipments this year will be higher than in 1948. New developments in this field last year included an air navigation instrument known as the Zero Reader and improved types of marine navigation instruments.

Sperry's farm machinery division, located in New Holland, Belleville, Mountville and Lancaster, Pa., operated for the first full year in 1948. A newly developed forage harvester and silo filler were added to the baling, raking and loading equipment line by acquisition of Dellinger Mfg. Co., Lancaster.

During 1948 Ford Instrument Co. Inc., maker of gunfire control equipment and other apparatus, Benwood-Linze Co., manufacturer of electric devices, and Wright Machinery Co., producer of weighing, packaging and labeling machinery, were also acquired.

Sperry products had a shipment value last year of $120,859,852. Corporation's net income was $8,770,523 in 1948 compared with $5,673,019 in 1947.

Briefs . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Reynolds Metals Co., Richmond, Va., has purchased the Extruded Metals Inc. aluminum plant at Grand Rapids, Mich., from War Assets Administration for $1.5 million. Reynolds had been operating the plant since June 1, 1946, on lease.

—o—

L. O. Koven & Bro. Inc., Jersey City, N. J., manufacturer of boilers, tanks, piping and related equipment, has installed a new 1000-ton Bliss drawing press at its Dover plant.

—o—

American Emery Wheel Works, Providence, R. I., has appointed Allmon Products Division, Allmon Steel Co., Pittsburgh, as its representative in western Pennsylvania, West Virginia and eastern Ohio.

—o—

Armco Steel Corp., Middletown, O., reports its 4500 employees at the East Works had no lost-time accidents during March and at the same time set a new record for monthly shipments.

—o—

American Car & Foundry Co., New York, reports it produced 3133 railroad cars in March, an all-time high for any single railroad equipment manufacturer since 1930. Of the total, 2995 units were domestic freight cars, 85 were for export purposes, and 53 were passenger cars for domestic service.

—o—

Amplex Mfg. Co., a subsidiary of Chrysler Corp., has completed a new plant at 65th and Harper Ave., Detroit, which provides expanded facilities for production of heavy-duty, oil cushion bearings, finished machine parts, filters, friction units and bar stock.

—o—

Youngstown Sheet & Tube Co. reports its Steam & Power Division in the Youngstown district recently chalked up 1 million man-hours without a lost-time accident, for the second time. The department achieved the safety record for the first time in 1943.

—o—

J. C. Corrigan Co. Inc., Boston, has been licensed to manufacture a complete line of portable conveyors and stackers under an agreement with Jeffrey Mfg. Co., Columbus, O., which supplies the designs and specifications for their construction.

—o—

Pure Carbonic Inc., an Air Reduction subsidiary and supplier of carbon dioxide, has opened a $3 million plant at 1856 S. Lumber St., Chicago.

—o—

Chicago Association of Commerce & Industry reports new construction, additions and acquisition of land and buildings for industrial purposes in the Chicago area for the first 1949 quarter totaled $27,636,000, compared with $39,926,000 for the first 1948 quarter.

—o—

Bethlehem Steel Co. produced about 1,294,000 net tons of ingots in March, an all-time record. The previous high, 1,264,762 tons, was made in January of this year.

—o—

Atomic Energy Commission has established a Patent Compensation Board to consider and act on applications arising under the patent and invention provision of the Atomic Energy Act. Casper W. Ooms, a practicing Chicago patent attorney, is board chairman.

U.S. STEEL PETITIONED

FEDERATION of Women Shareholders in American Business is petitioning directors of the United States Steel Corp. to amend the by-laws to permit a change in the meeting place of corporation stockholders, from Hoboken, N. J., to New York city. Spokesman for the federation points out that 17.3 per cent of the corporation's stockholders, or the largest single concentration, live in New York state.

—o—

Black & Decker Mfg. Co., Towson, Md., maker of portable electric tools and related products has moved its Chicago sales and service station to a new building at 1100 W. Jackson Blvd. which doubles its facilities. R. G. Horner is branch manager.

—o—

General Electric Co., Schenectady, N. Y., will supply more than $1 million in equipment to convert to electric drive Lukens Steel Co.'s 206-in. plate mill at Coatesville, Pa.

—o—

Dulien Enterprises Inc. has been formed at 40 Exchange Place, New York, by Louis Dulien who also heads Dulien Steel Products Inc., Seattle, Portland, Oreg., San Francisco and Los Angeles. The eastern firm, like the western, will deal in industrial liquidations and the buying and selling of machinery, relaying rails, railroad equipment and scrap iron and steel in the domestic, import and export fields.

—o—

Eutectic Welding Alloys Corp., New York, has begun production of welding products at a new plant in Flushing, N. Y., which houses a foundry, metal rolling and drawing units, several large extrusion presses and alloy cutting facilities.

—o—

D. J. Murray Mfg. Co., Wausau, Wis., has appointed the following manufacturers' agents as distributors of its Grid unit heaters and allied products in their respective areas: I. Ernest Shaer, Boston; G. T. Pottinger & Co., Atlanta; Jordan Engineering Co., Casper, Wyo.

—o—

Weldaloy Products Co., Detroit, has purchased and is now operating a new plant adjoining its present location. New facilities house Weldaloy's metallurgical research and engineering divisions.

—o—

Ohio Gear Co., Cleveland, has appointed Atlantic Gear Works Inc., New York, as distributor of stock gears in New York, Connecticut and northern New Jersey.

—o—

Ajax Electric Co. Inc., maker of salt bath furnaces, has moved its manufacturing facilities to a new plant at Tioga and Melville streets in Philadelphia. The Ajax business office remains at Frankford and Delaware avenues, Philadelphia.

—o—

Carnegie-Illinois Steel Corp. has completed the No. 16 battery of coke ovens at its Gary, Ind., works. The battery includes 77 ovens, increases the plant's oven total to 1132 and adds daily coke output of more than 1000 tons.

—o—

Whiton Machine Co., New London, Conn., maker of lathe chucks, gear cutters and other products, has appointed H. C. Hook Co. Inc., Worcester, Mass., as its sales agent in Massachusetts, Rhode Island, Vermont, New Hampshire and Maine. Vandyck Churchill Co., New Haven, Conn., has been named Whiton's representative in Connecticut.

—o—

Hewitt Rubber Division, Hewitt-Robins Inc., Buffalo, has appointed Mine Service Co., Lothair, Ky., as distributor in Perry, Letcher, Knott and Leslie counties, Kentucky. Mine Service will also represent Robins Conveyors Division.

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The Business Trend

LEVEL of industrial activity continued to rise in the week ended Apr. 9 as STEEL's industrial production index rose another point to reach a preliminary 172 per cent of the 1936-1939 average, for the second best mark registered this year. Just two weeks earlier the index was at 167, tying the lowest point for the year.

AUTOMOBILES—With outturn of passenger cars and trucks at 130,197 units for the week ended Apr. 9, the automotive industry posted its best weekly total since 1941 and was a big factor in the rise of STEEL's index. The latest week's total is not capacity for the industry, however, as one builder has suspended assemblies for model changeover and another had difficulty in obtaining bodies because of a wildcat strike at the plant of a body supplier. Schedules for the second quarter call for production to challenge the all-time high of 1,867,475 passenger cars and trucks reached in the same period of 1929.

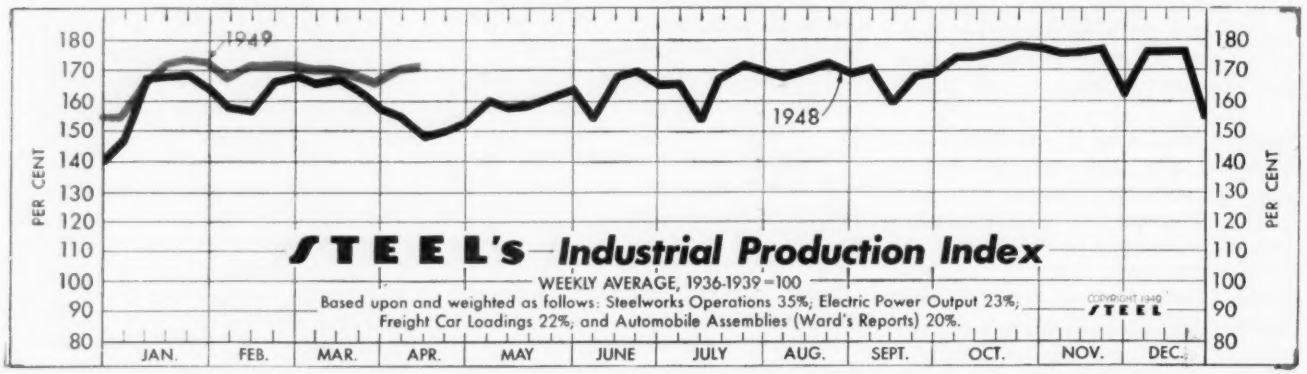
CONSTRUCTION — Contracts awarded for building and engineering works in the 37 states east of the Rockies declined 9 per cent from the corresponding period of 1948. Awards in the first quarter totaled $1,799,070,000 compared with $1,986,936,000 in the corresponding period of last year. March awards, however, were up sharply over the same month in 1948 and reduced considerably the margin of decline shown for the first two months of 1949.

STEEL—Output of steel for ingots and castings declined for the third consecutive week to reach 98.5 per cent of capacity in the week ended Apr. 9. Although this rate represents a slowing down from the pace maintained by the industry since the first of year, production during the week was greater than the 1948 weekly capacity. With demand for a variety of steel products less frantic than it was a few months ago, the industry will probably gradually slow its breakneck pace of recent months, with some industry observers predicting an operating rate around 90 per cent by the end of the second quarter.

INVENTORIES — Total business inventories at the end of February were $54.6 billion, up seasonally about $450 million from the January level, according to the Department of Commerce. Bulk of the increase was in retail inventories in preparation for the holiday trade.

RAILROADS—Domestic freight car deliveries during March totaled 11,882 for the highest production month since the program calling for 10,000 cars a month was initiated in March, 1947. The American Railway Car Institute reports that of March deliveries 8958 were from the car builders and 2942 were built in railroad shops. Production on the leading types of cars was: Box, 2510; hopper, 6744; gondola, 1163; refrigerator, 896; and tank, 470.

PRICES—Wholesale price index of the Bureau of Labor Statistics declined another 0.1 per cent during the week ended Apr. 5 to 158 per cent of the 1926 average. Metals and metal products index dropped 0.3 per cent in the same period to 174 per cent.



Index (chart above): Week ended Apr. 9 (preliminary) 172 Previous Week 171 Month Ago 170 Year Ago 148

BAROMETERS of BUSINESS

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	98.5	100.0	100.5	78.0
Electric Power Distributed (million kilowatt hours)	5,360	5,378	5,531	5,033
Bituminous Coal Production (daily av.—1000 tons)	1,609	395	1,722	355
Petroleum Production (daily av.—1000 bbl)	4,916	5,072	5,123	5,377
Construction Volume (ENR—Unit $1,000,000)	$178.2	$132.2	$184.6	$93.8
Automobile and Truck Output (Ward's—number units)	130,197	119,088	114,223	103,004

* Dates on request. † 1949 weekly capacity is 1,843,516 net tons. 1948 weekly capacity was 1,802,476 net tons.

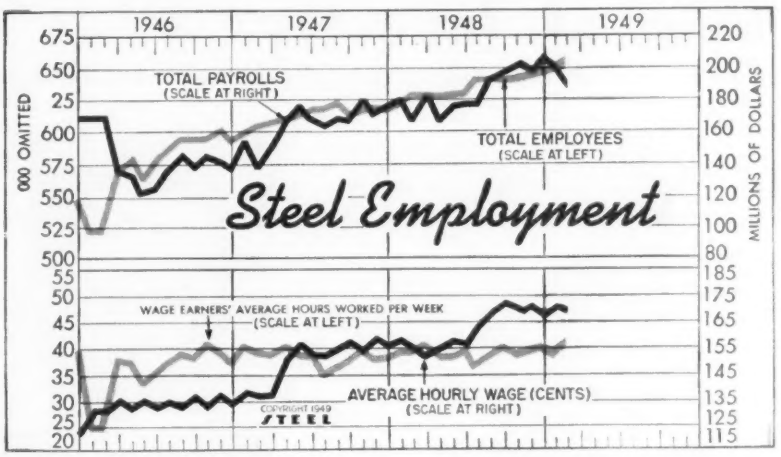
TRADE				
Freight Carloadings (unit—1000 cars)	729†	726	709	684
Business Failures (Dun & Bradstreet, number)	236	216	179	79
Money in Circulation (in millions of dollars)‡	$27,514	$27,403	$27,577	$27,833
Department Store Sales (changes from like wk. a yr. ago)‡	+8%	−16%	−8%	−12%

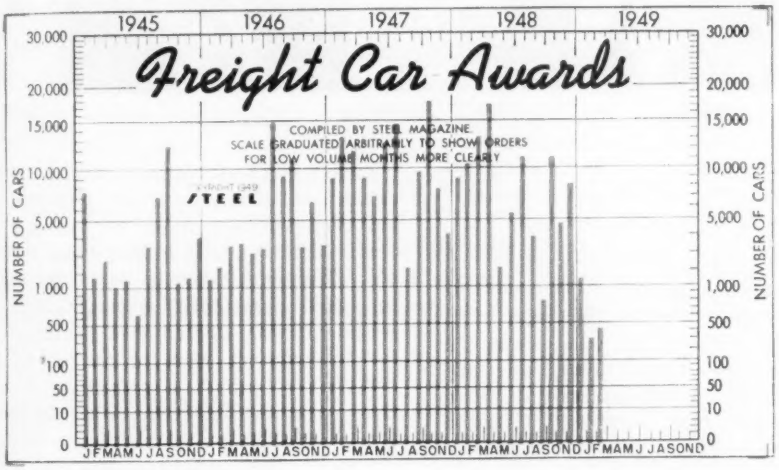
† Preliminary. ‡ Federal Reserve Board.

Steel Employment

	Employees† (000)		Total Payrolls (millions)		Hourly Wages† (cents)	
	1949	1948	1949	1948	1949	1948
Jan.	650	622	$202.1	$180.2	171.3	157.3
Feb.	653	626	$189.8	$167.6	169.6	155.1
Mar.	...	629	....	183.0	....	154.8
Apr.	...	626	....	168.5	....	155.1
May	...	628	....	175.3	....	157.7
June	...	634	....	179.5	....	156.9
July	...	641	....	179.8	....	164.5
Aug.	...	645	....	193.8	....	168.9
Sept.	...	641	....	199.4	....	171.8
Oct.	...	644	....	201.7	....	169.9
Nov.	...	646	....	199.8	....	172.1
Dec.	...	648	....	205.8	....	169.4

† Monthly average.




1945
1946
1947
1948
1949
Freight Car Awards
COMPILED BY STEEL MAGAZINE.
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1949 STEEL
NUMBER OF CARS
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

Freight Car Awards

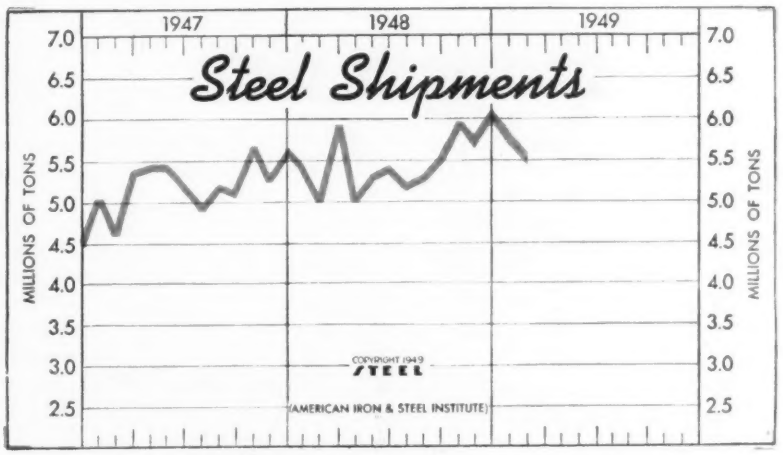
	††1949	*1948	*1947	*1946	1945
Jan.	1,568	8,613	9,222	1,481	7,200
Feb.	332	10,698	13,724	2,328	1,750
Mar.	469	13,227	12,048	4,512	2,500
Apr.	....	17,215	9,186	3,564	1,120
May	....	2,228	7,389	2,900	1,526
June	....	5,368	12,784	3,335	670
July	....	11,308	14,840	14,836	3,500
Aug.	....	3,638	2,352	9,527	7,240
Sept.	....	738	9,917	11,102	12,840
Oct.	....	10,931	17,737	3,407	1,320
Nov.	....	4,852	8,079	7,190	1,650
Dec.	....	8,368	4,030	3,011	4,116
Total	....	97,184	121,308	67,193	45,432

* American Railway Car Institute
† Preliminary.

Steel Shipments

(Net Tons)

	1949	1948	1947
Jan.	5,778,632	5,410,438	5,061,333
Feb.	5,519,938	5,046,115	4,626,424
Mar.	.....	5,978,551	5,304,415
Apr.	.....	5,096,161	5,445,993
May	.....	5,321,375	5,442,343
June	.....	5,476,774	5,263,711
July	.....	5,229,880	4,974,566
Aug.	.....	5,329,060	5,278,223
Sept.	.....	5,511,474	5,118,839
Oct.	.....	5,952,008	5,681,597
Nov.	.....	5,732,256	5,216,990
Dec.	.....	6,056,282	5,613,036



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$13,597	$12,592	$12,233	$13,719
Federal Gross Debt (billions)	$251.5	$251.7	$252.0	$252.4
Bond Volume, NYSE (millions)	$16.9	$16.6	$14.8	$25.0
Stocks Sales, NYSE (thousands)	4,834	6,538	4,515	6,473
Loans and Investments (billions)†	$61.2	$61.7	$62.0	$62.2
United States Gov't. Obligations Held (millions)†	$31,750	$32,680	$33,069	$34,433

* Member banks, Federal Reserve System.

PRICES

STEEL's Composite Finished Steel Price Average	$94.91	$96.68	$97.77	$81.14
STEEL's Nonferrous Metal Composite‡	209.4	216.9	227.9	196.6
All Commodities†	158.0	158.1	158.9	160.3
Metals and Metal Products†	174.0	174.6	175.2	156.8

† Bureau of Labor Statistics Index, 1926=100. ‡ 1936-1939=100.

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Men of Industry

PHILIP FINALE

CHARLES W. MEYERS

JAMES F. McCARTNEY

Philip Finale has joined Loewy Construction Co. Inc., Rolling Mill Division of Hydropress Inc., New York, as chief engineer. He has been associated with Mesta Machine Co. since 1928, where he held the positions of rolling mill designer and proposal engineer until 1939. During the war he assisted the company in development of a special plant for the United States Army, and upon completion of this project became rolling mill department engineer.

—o—

Dr. Mark E. Putnam, a vice president since 1942 of Dow Chemical Co., Midland, Mich., has been named general manager, and **Dr. A. P. Beutel**, general manager, Texas Division, and **Russell L. Curtis,** general manager, Great Western Division, have been named vice presidents. **Carl A. Gerstacker** was elected treasurer, and **Calvin A. Campbell,** the firm's legal counsel, was elected secretary.

—o—

J. H. Denton has been appointed manager, sales administration, home office, for Carborundum Co., Niagara Falls, N. Y. He succeeds **D. S. Masson,** who is taking over responsibilities of assistant to the district sales manager at Detroit.

—o—

Midvale Co., Philadelphia, announces election of the following directors for the coming year: **Francis Bradley, Charles E. Brinley, Henry C. Bryans, Joseph N. Ewing, James E. Gowen, Edward Hopkinson Jr., Lewis W. Metzger, Richard T. Nalle, Evan Randolph, Robert C. Shields, Marvin W. Smith** and **Henry H. Ziesing.**

—o—

Dr. Frank J. Zvanut will head the newly formed Clay Division of Ferro Enamel Corp., Cleveland, and **Earl Skillicorn** succeeds him as manager of process and quality control.

—o—

Formation of a separate mechanical spring sales division, the sixth independent division in the company's general sales department, was announced by American Steel & Wire Co., Cleveland, subsidiary, United States Steel Corp. **Charles W. Meyers** was named manager of the new division, to be known as Spring Products Sales Division. **Robert D. Knight** was appointed assistant manager.

—o—

Walter A. Stewart, trustee and former vice president, American Optical Co., Southbridge, Mass., has been elected president, succeeding **George B. Wells,** resigned after serving in that capacity for 12 years. Mr. Wells became president in 1936, resigned the office in 1946 to provide for the succession of the late **Charles O. Cozzens,** and returned as president when Mr. Cozzens died in 1947.

—o—

Donald L. Colwell, sales engineer, Apex Smelting Co., Chicago, has returned from abroad. He and **Albert Butler** of Denver were sent to six European countries by the Economic Cooperation Administration to examine the aluminum requirements of Europe.

—o—

Thura A. Engstrom has been elected executive vice president, Continental Motors Corp., Detroit, and **Frederick H. Faust** was elected secretary. Mr. Engstrom has served the company in various capacities in its Manufacturing Division since 1925. He was elected vice president and factory manager of the Muskegon, Mich., Division in 1947, and more recently has been works manager for the Aircraft, Automotive and Industrial Engine Divisions. **Lewis P. Kalb,** director, and, heretofore, executive vice president, was elected vice president for the coming year to permit his full-time attention to affairs of the Gray Marine Motor Co., a Continental subsidiary, of which he was recently made general manager.

—o—

Duff-Norton Mfg. Co., Pittsburgh, announces appointment of **James F. McCartney** as eastern district sales manager, with headquarters in New York. He succeeds **G. L. Mayer,** retired, but who will continue with the company in an advisory capacity. Mr. McCartney was formerly associated with the Pressed Steel Car Co. Inc., and for the past seven years has been eastern representative with offices in New York.

—o—

J. G. C. McNair has been named to direct sales of white lead for National Lead Co., New York. **Robert L. Banes** has been appointed comptroller of the St. Louis Smelting & Refining Division of the company, and the following three were appointed to executive positions in the Baroid Sales Division—**W. L. Heater,** general sales manager, retaining his title as assistant to the general manager; **Edward J. Hagstette Jr.,** manager of the products procurement department; and **Arthur Langton,** manager of the advertising department.

—o—

John E. Ellas, a salesman in the Detroit branch office, Berger Mfg. Division, Republic Steel Corp., Cleve-

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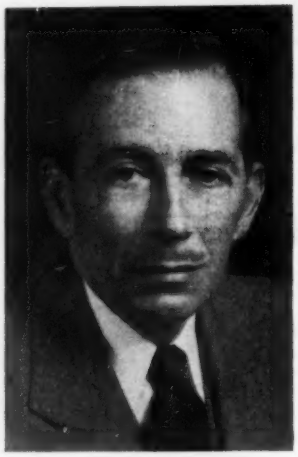

BYRON E. RHOADS

HOWARD H. STURDY

the 1949 Willis Rodney Whitney Award to **Dr. R. B. Mears,** manager of the research laboratory, Carnegie-Illinois Steel Corp., Pittsburgh, and the 1949 Frank Newman Speller Award to **F. L. La Que,** in charge of the corrosion engineering section, International Nickel Co. Inc., New York.

—o—

Dravo Corp., Pittsburgh, announces election of three new directors and two new vice presidents. Directors are **Gordon W. Cameron,** treasurer, Aluminum Co. of America; **Louis A. Mertz,** vice president and treasurer, Dravo Corp.; and **Howard H. Sturdy,** general manager, Contracting Division, Dravo Corp. The vice presidents elected are Mr. Sturdy and **Byron E. Rhoads,** chief engineer of Dravo's Contracting Division.

—o—

L. McGregor Demarest, Spencer Montgomery and **Sidney E. Horton** have been elected additional directors of E. Horton & Son Co., Windsor Locks, Conn. Mr. Demarest is head of L. M. Demarest & Associates, industrial engineer and consultant firm, New York; Mr. Montgomery is president, Montgomery Co., Windsor Locks; and Mr. Horton is past president and director of the company, and is New England manager for Bardons & Oliver Co., Cleveland, of which he is also a director.

—o—

John L. Savage has been designated 1949 winner of the Washington Award, presented by the American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Society of Mining & Metallurgical Engineers, and the Western Society of Engineers.

—o—

Logan C. Miller has been appointed general manager of the newly named Rouge Division of the Ford Motor Co., Dearborn, Mich. The division forms the major part of the former General Production Division. Mr. Miller has been with the company since 1914, and for the past three years has been general manager of the Rouge automotive manufacturing operations. **Ray H. Sullivan,** assistant to Mr. Miller, will now head these operations. Mr. Sullivan joined Ford last September, and prior to that time was vice president in charge of manufacturing, E. W. Bliss Co.

—o—

Dr. Carl F. Prutton has been appointed vice president-director of operations of all Mathieson Chemical Corp.'s plants, and **Arthur T. Bennett,** vice president of the company, was placed in charge of the eight plants acquired from Southern Acid & Sulphur Co. **R. B. Worthy** and **J. F. Newell** were named vice presidents of Mathieson Chemical Corp., New York. Dr. Prutton, who joined Mathieson last year as director of research, will have charge of research and supervise operations of all the company's plants including those recently acquired. Before joining the company he was head of the department of chemistry and chemical engineering, Case Institute of Technology, Cleveland. He will have headquarters in New York. Mr. Bennett will have headquarters in Houston, Mr. Worthy at the Saltville, Va., plant, and Mr. Newell remains at Lake Charles, La., plant.

—o—

Hugh H. Trumbull has joined the sales organization of United Steel Products Inc., Worcester, Mass. He formerly was with Sharon Steel Corp.

—o—

Jerome Sabel has been appointed to the sales force of E. H. Fairchild, Chicago, which is a representative for Automatic Transportation Co., Chicago. Mr. Sabel will cover the Louisiana and Mississippi territory. He formerly was owner of Temple Electric Co., New Orleans.

—o—

Harry C. Dumville has been appointed director of the new devices section of General Motors Corp., Detroit. Assistant director of the section since 1944, he succeeds **John H. Hunt,** retiring after 36 years' service, the last 17 as head of the section.

—o—

Arthur E. Smith has been named chief engineer, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn. He has been assistant chief engineer of the Engine Manufacturing Division since 1944.

—o—

George G. Main has been elected treasurer, Westinghouse Electric Corp., Pittsburgh, to succeed the late **L. H. Lund.** Mr. Main has served as assistant treasurer and assistant secretary since 1945. His headquarters will be in Pittsburgh.

—o—

Dawson Spurrier, director and vice president, High Vacuum Processes Inc., Philadephia, has been elected president of the corporation. **Austin K. Smithwick,** vice president, A. W. Smith & Co., Boston investment bankers, is the new board member of High Vacuum.

—o—

E. King Graves has been appointed sales manager, Edward Ermold Co., New York. He has been assistant sales manager of the company.

—o—

Frank A. Weiss has been appointed assistant to general manager, Hyatt Bearings Division, General Motors Corp. in Harrison, N. J. **Leo V. Farrell,** formerly assistant purchasing agent, was promoted to general purchasing agent, the position formerly held by Mr. Weiss.

—o—

Ray Rice, for the past four years publicity director, Raytheon Mfg. Co., New York, will resign that position on May 1 to open his own office at 60 E. 42nd St., New York. He will retain his present staff and take over the space now occupied by Raytheon's publicity department. He will continue to handle Raytheon's publicity on an account basis.

—o—

Olin L. Medley has joined the sales engineering staff of Black, Sivalls & Bryson's Shreveport, La., branch. **Joe Beggs,** who has managed the company's branch at McPherson, Kans., has been trasferred to manager of

DoALL has become Inspection Headquarters

Reg. U.S. Pat. Off.

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land, has been promoted to manager of the Kansas City, Mo., branch office of the division. He is succeeded at Detroit by **Richard E. Lautzenheiser.**

—o—

Ceco Steel Products Corp., Chicago, announces the following appointments: **H. G. Haake,** vice president and district manager, Los Angeles, has been appointed manager in general charge of Ceco operations in all Pacific Coast states. He will have headquarters at Los Angeles. **W. F. Norton** is appointed assistant district manager, Los Angeles. **F. E. Jennings,** district manager, and **P. E. Johnson,** assistant district manager, continue in charge of the San Francisco office.

—o—

H. R. Russell, general sales manager, Tinnerman Products Inc., Cleveland, and **William M. Buttriss,** director of advertising and sales promotion, headed the Tinnerman delegation at the Western Metals Show in Los Angeles, held Apr. 11 to 15.

—o—

Dr. Harry K. Ihrig, vice president and director of laboratories, Globe Steel Tubes Co., Milwaukee, received a citation for distinguished service in engineering from the College of Engineering, University of Wisconsin, Madison.

—o—

Richard W. Berg has been appointed district manager of the Pittsburgh office of Torrington Co., Torrington, Conn., and South Bend, Ind. He joined Torrington in 1944 and has been district engineer in the Pittsburgh territory since 1945.

—o—

Paul T. Persons has been appointed district representative, Oliver Iron & Steel Corp., Pittsburgh, Pole Line Materials Division. He will make his headquarters in Charlotte, N. C., and will service North and South Carolina and eastern Tennessee.

—o—

Loran F. Hammett has been appointed assistant to vice president of operations, Pittsburgh Steamship Co., Cleveland, subsidiary of United States Steel Corp. **A. S. Thaeler** was named assistant to vice president of engineering, and **David V. Barackman** was made assistant to comptroller.

—o—

Crucible Steel Co. of America, Pittsburgh, announces the appointment of **A. D. Murphy** as director of safety for the company. He formerly was supervisor of industrial relations at Atha Works, Harrison, N. J.

—o—

J. Gilman Reid has been appointed chief, Engineering Electronics Laboratory, National Bureau of Standards, Washington.

—o—

Stanley H. Hobson was elected president, Gas Appliance Manufacturers Association. He is president, George D. Roper Corp., Rockford, Ill. He and other officers elected will not take office until October. He will succeed **Frank J. Nugent**, Cleveland.

—o—

Dr. Elmer C. Larsen has been appointed chief engineer for the Tungsten & Chemical Division, Sylvania Electric Products Inc., New York. Dr. Larsen was formerly assistant director of research, J. T. Baker Chemical Co. **James J. Sutherland** was appointed general manager, Electronics Division of Sylvania. He has been serving as controller of the division at Boston.

—o—

David M. Nason has joined the New Holland Machine Co., New Holland, Pa., farm machinery subsidiary of Sperry Corp., as assistant purchasing agent. He previously was associated with F. J. Stokes Machine Co. in Philadelphia, and Westinghouse Electric Corp. in Philadelphia.

—o—

Southern States Iron Roofing Co. announces the appointment of **Paul B. Hill** as sales representative in its Greenville, Miss., territory. He replaces **J. W. Shaw,** resigned to accept a position in California.

—o—

W. J. Osborn has been appointed district manager at San Francisco for Hagan Corp., Pittsburgh. He succeeds **Clyde F. Williamson,** resigned. **Alfred Pittman** has been appointed marine manager, San Francisco office, **Orville Morrow** continues as chief of Hall boiler water service in the stationary field, San Francisco area, and **Douglas Barrett** will handle Hagan combustion control service in the stationary field.

—o—

Fred A. Kaufman has been appointed sales manager, Electrode Division, McKay Co., Pittsburgh. He formerly was chief metallurgical engineer in charge of technical service, research and quality control at the York, Pa., plant.

—o—

Jack A. Cairns, formerly assistant to the Western Division sales manager, Hyster Co., Portland, Oreg., has been transferred to a sales engineering position in the Los Angeles area. New district manager of industrial truck sales in the Western Division of the company at Portland is **William Kilkenny.**

—o—

R. E. Valk has been appointed works manager of the Toledo, O., plant of National Supply Co. He has been assistant works manager, and succeeds **L. A. Ringman,** resigned.

—o—

National Association of Corrosion Engineers, Houston, has presented

RICHARD W. BERG

DR. ELMER C. LARSEN

R. E. VALK

LELAND I. DOAN

Who has been elected president of Dow Chemical Co., Midland, Mich. - Noted in STEEL, Apr. 11 issue, p. 77

RICHARD J. CONROY

Los Angeles district manager, Whitman & Barnes Division, United Drill & Tool Corp. Noted in STEEL, Apr. 11 issue, p. 74

LEE E. WALLACE

Named general manager of sales, Youngstown Sheet & Tube Co., Youngstown. Noted in STEEL, Apr. 11 issue, p. 74

Ellinwood, Kans., branch, and is succeeded at McPherson by **Winston O. Shook. N. F. Barnes,** formerly of Ellinwood, has been transferred to the Sales Division, and will be stationed at the regional offices at Great Bend, Kans. **Charles W. Stevens** has been transferred to San Angelo, Tex., from Odessa, Tex., where he will act as sales representative.

—o—

Hugh J. Pugsley has been elected vice president, Swindell - Dressler Corp., Pittsburgh. He will be in charge of the company's Combustion Furnace Division. Mr. Pugsley has been with the company for over 22 years, during which he has been engaged in engineering and sales activities connected with combustion furnaces.

—o—

Copperweld Steel Co., Glassport, Pa., announces election of **Maurice J. Mahoney** as secretary of the company, and **Charles A. Taylor** as controller. Mr. Mahoney joined Copperweld in 1941 as attorney and tax officer. Mr. Taylor became associated with the company in 1939 as assistant controller.

—o—

Electric Products Co., Cleveland, has appointed **E. Lowe McIntyre Jr.** as assistant sales manager in charge of new market developments. He will be located at Cleveland. He has had previous connections with Westinghouse Electric Corp. and Jack & Heintz Precision Industries Inc.

—o—

J. B. Neiman will resign June 1 as general manager of the general aluminum department, Federated Metals Division, American Smelting & Refining Co., Detroit. He has been with the Federated Metals and its predecessors in various executive capacities since 1911. Mr. Neiman has been president of Aluminum Research Institute for the past eight years.

—o—

Fred R. Cooper has resigned as vice president in charge of sales, Kaiser-Frazer Corp., Willow Run, Mich., to engage in other business activities. **Walter De Martini** continues as director of sales, and **W. G. Morrison** as assistant director.

—o—

J. Sydney Snelham, vice president and comptroller, Continental Can Co. Inc., New York, was elected a director of Vulcan Detinning Co., Sewaren, N. J.

—o—

R. E. Kenney has been appointed Midwest sales representative for Kold-Hold Mfg. Co., Lansing, Mich.

OBITUARIES . . .

McMillan Robinson, 38, sales manager, Metal Products Division, Koppers Co. Inc., Pittsburgh, died Apr. 4. He had headquarters in Baltimore. Mr. Robinson joined the Koppers Co. last November after three years as vice president and sales manager, Ocean City Mfg. Co., Philadelphia.

—o—

Martin J. O'Donnell Sr., founder of the M. J. O'Donnell Elevator Co., Cleveland, which was sold in 1906 to Otis Elevator Co., died Apr. 11. Mr. O'Donnell remained with Otis Elevator Co. for seven years as vice president.

—o—

Samuel O. Hobart Sr., 70, expert in the mining of iron ores and production of pig iron, died Apr. 8. He served at one time as consultant to National Lead Co. for the development of titanium mines in the Adirondacks, and as adviser at the Wharton, N. J., blast furnace of Republic Steel Corp. During World War II Mr. Hobart served with the War Production Board as an adviser and consultant in iron production.

—o—

Benjamin A. Schutz, 66, eastern sales manager, Alabama Pipe Co., Anniston, Ala., died recently.

—o—

Harry M. Hooker, 75, former president and retired chairman of the board of directors of Hooker Electro-Chemical Co., Niagara Falls, N. Y., died Apr. 9.

—o—

Martin Rintz, 65, superintendent, Continental Foundry & Machine Co., East Chicago, Ind., died Apr. 7. He had been affiliated with the foundry industry over 50 years. He joined Continental in 1928 as general foreman, and was advanced to superintendent in 1936.

—o—

Raymond N. McAdams, 65, former secretary, Hercules Powder Co., Wilmington, Del., died Apr. 9.

—o—

William C. Mattison, secretary, Woodstock Slag Corp., Birmingham, died Apr. 2.

—o—

Stanley K. Williams, 71, retired vice president, S. K. Williams Co., Milwaukee, died Apr. 5.

—o—

Walter F. Welsh, 57, sales engineer, Bigelow-Liptak Corp., Detroit, died recently. He represented the company in the Michigan territory for the past 15 years.

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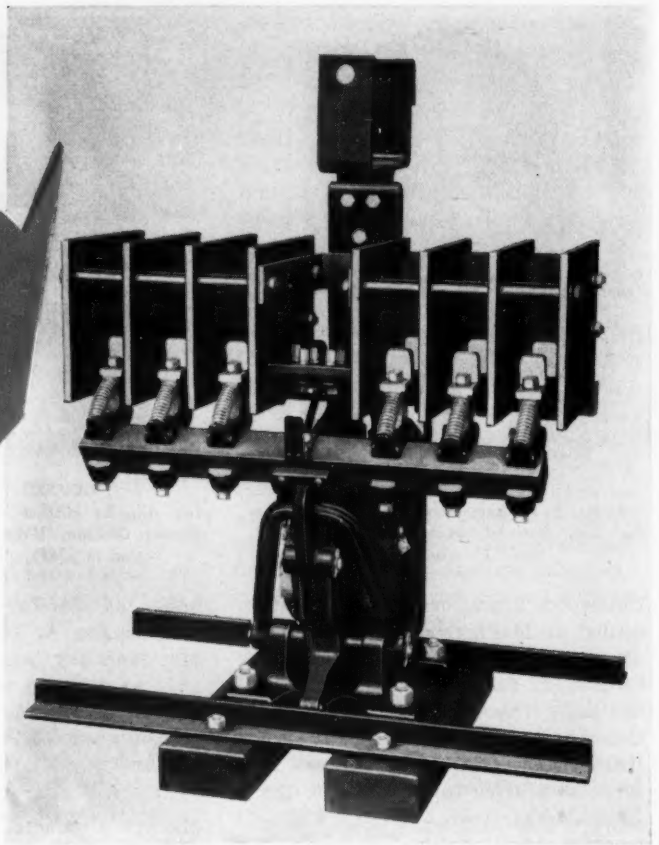
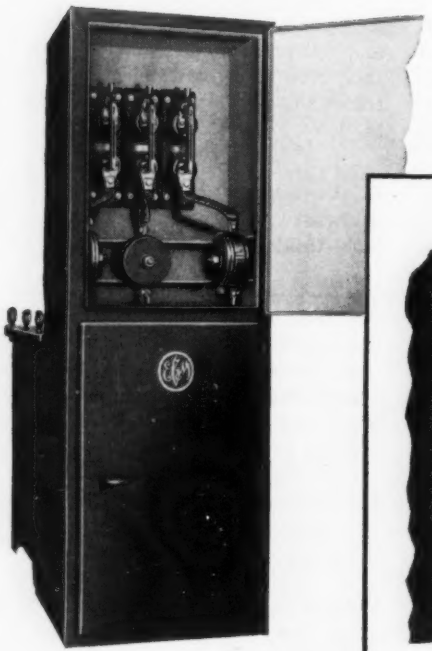
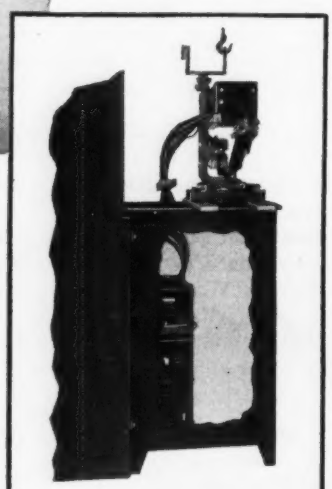
Known for

1. LONG LIFE
2. HIGH INTERRUPTING ABILITY



WILL *SAFELY* OPEN *ANY* CIRCUIT . . . EC&M VALIMITOR STARTERS FOR 2300 - 4600 VOLT MOTORS GIVE *CONTINUOUS* PROTECTION REGARDLESS OF AVAILABLE KVA





Contactor lifts out without disconnecting any leads or bolts.

Many users of 2300-4600 volt motor control equipment have found that there is nothing to compare with the EC&M TYPE ZHS, *heavy-duty*, magnetic contactor. It has a successful record for starting *all types* of high voltage motors. On reversing or quick-stop by plugging applications, two (or three) ZHS Contactors, *mechanically* as well as *electrically* interlocked, are giving efficient results. Upkeep in any service is low. ● The ZHS Contactor permits *complete, continuous* protection of 2300-4600 volt motor circuits. The *maximum* fault is limited to 25,000 KVA (steady state current) in the VALIMITOR Starter. The ZHS Contactor not only clears faults quickly and easily, but is capable of thousands of starts and stops without attention. For occasional inspection, lift it out of the tank without disconnecting any leads or bolts.

There's no ceiling on VALIMITOR protection

WRITE FOR No. 23 ACCELERATOR ISSUE ON ZHS VALIMITOR STARTERS

THE ELECTRIC CONTROLLER & MFG. CO.
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Engineering News . . . AT A GLANCE

TAUT PRODUCTION PROCEDURE— Some 67 operations are involved in processing precision aircraft parts from forgings in Ex-Cell-O's Precision Products Division, Detroit. During these operations inspection plays a big part in keeping production taut. For example, it is necessary to inspect the parts after each machining phase because succeeding operations locate from previous ones. A special checking fixture having 5 check points is employed for the final inspection. Nitrided aircraft propeller shoes are magnafluxed three times during process of manufacturing to detect cracks, seams or checks.

THICKNESS MONITOR—Thickness of sheet metals moving along a conveyor at high speeds now can be measured continuously by an instrument that indicates amount of beta-rays which are absorbed by the material being checked. The device, developed by General Electric Co., Schenectady, N. Y., actually indicates the mass per unit area of the material under test without contacting it in any manner. It is said to be capable of monitoring thickness of metal foils, both ferrous and nonferrous, as well as textiles, plastics, rubber and other sheet materials. In operation, the gage measures the deviation from a chosen setting by registering amount of beta-rays which the material under test absorbs.

BOOMS SAFETY BUSINESS— Number of persons needed properly to control hazards where radioactive materials are used is much greater than the number presently required to control usual industrial accidents or health hazards, according to E. C. Barnes, industrial hygiene engineer, Westinghouse Electric Corp., Pittsburgh. He pointed out recently that 3 per cent of the persons working in an atomic energy plants are involved in health hazard control. In a plant of 5000 persons employing only three safety engineers, it would be necessary to boost the health protection group to 150 persons if the plant was suddenly involved in processing radioactive material.

CONSTANT WHEEL TRUER— Most of the human element in using industrial diamond tools for grinding wheel dressing is eliminated by an accessory developed by Wheel Trueing Tool Co., Detroit. It not only maintains correct cutting angle on the diamond but, by means of an indexing device, provides metered turning of the tool either manually or automatically so that the same facet of the diamond never turns up twice to contact the wheel. Thus no facet is ever re-used in identical form but is always turned just enough to present an effective cutting edge, to maintain top cutting efficiency.

REQUIRES VACUUM CASTING— Another series of alloys, based on chromium, with upward of 50 per cent of this metal, is showing great promise for high-temperature services, it was revealed recently by John D. Sullivan, assistant director, Battelle Memorial Institute, Columbus. In preliminary tests, one such alloy, containing 60 per cent chromium, 15 to 25 per cent molybdenum and balance iron, showed up better than the cobalt-base alloys, and gives promise of permitting safe use at still higher stresses. This alloy, he pointed out, must be melted and cast in a vacuum. Other promising metals named were titanium, columbium, tantalum, molybdenum and tungsten.

FLEXIBLE HANDLING — Two handling fleets are used for processing materials from floor cribs to production areas in Carrier Corp.'s multistory plant in Syracuse, N. Y. Major fleet is an industrial truck group equipped with special forks to move unit-load equipment and cycle dollies directly to subassembly and assembly areas. The other is a fleet of cycle dollies consisting of manually-propelled shelf trucks. (p. 82)

PRECISE HEATING—To meet the shock, fatigue and corrosive effects of present day oil production, "sucker rods" processed in the plant of Oil Well Supply Co., Dallas, are heat treated on a precision basis. After the ends of the blanks are subjected to five separate forging operations to form full-strength pins, the rods are triple heat treated over their entire length by a special process involving normalizing, quenching and stretch-straightening. Heating is done in special gas-fired furnaces, and automatically controlled by electric pyrometers. (p. 85)

GIANT WELDER—Huge welder soon to be assembled for operation in the Lustron Corp. plant, Columbus, will be capable of producing 72 truss sections per hour—of the type currently used in steel homes. The unit with its fixtures and conveyor system is expected to be 200 feet long, probably making it one of the largest automatic multiple-spot welding machines in existence. (p. 87)

THREE BLOW STAGES—Blow of a bessemer converter in action actually consists of three stages, it is pointed out, most crucial being the shortest. Besides being the shortest, it also is the hardest to detect. Failure to do so results in excessive oxidation of the iron. The first stage, lasting from one-quarter to one-half the full length of the blow, is known as the silicon blow and is characterized by lack of a clear, distinct flame. Second stage commences with evolution of quantities of carbon monoxide. This provides an intense flame that lengthens—remaining steady almost to completion of carbon oxidation. The end point or third stage occurs in a little more than a second's time just as the luminosity of the carbon flame decreases prior to an abrupt increase in the oxidation of the iron. (p. 114)

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STANDARDIZED STEEL

Inter and intraplant flow of sheet steel at one fabricating and assembly plant is effectively controlled by use of standardized loads, methods and equipment

CONTROL of inter and intraplant flow of sheet steel in Carrier Corp.'s two Syracuse, N. Y., manufacturing facilities is effectively designed to take full advantage of the latest materials handling equipment and methods. A "live" storage system, using standardized loads, is now in operation facilitating the production of air-conditioning equipment, food freezers, industrial heaters and similar products.

One of the plants, located on a 59-acre site on Thompson Road, houses press shop and production lines for industrial units, including giant centrifugal refrigerating machines. The principal building covers 13½ acres of one-level floor space under the single roof.

Receiving and Storing—Appearance of a yard engine spotting gondolas under the east crane gantry at the Thompson road plant initiates the steel production control cycle. An operator moves a crane equipped with a manually-operated sheet metal lifter over one of the gondolas. Below, a rigger breaks loose the shipment of unit loads of steel and closes the long wide spread legs of the lifter about the bundles. From an adjacent raw stock bay, another rigger directs placement of the steel "packages" on trailers, and releases the grab.

Meanwhile, an industrial truck or trailer dispatched to the area engages the load trailer train and moves it cross-bay under handling equipment identical with that servicing the railroad. The latter equipment moves loads scheduled for immediate shearing to shears and carries the balance to raw stock stores, where it is segregated into smaller unit loads and stored. In a matter of minutes, a shipment of steel is readied for processing.

Processing—The usual type of feeding tables are positioned adjacent to shear equipment. To facilitate feeding the larger sheets, however, these tables are augmented by hydraulically operated elevating platform tables. As steel is placed on the tables by the crane crew, a second production control materials handling crew begins shearing the sheets. The comparatively small force of personnel and machines accomplish a formidable task in successfully complying with high production schedule requirements. Hour after hour, they slide steel through the shear blades.

With the exception of storage crib operators engaged in "making up" unit loads or cycle dollies of assorted material consigned to specific assembly stations, these shear operators are the only production control personnel in the plants to handle single pieces of raw or fabricated steel material. All further handling of steel after shearing is in specially-designed steel unit load equipment.

From the shears, pallet loads of large size sheets are scheduled to two lines of presses. Using accordion roller conveyors and wheel conveyors between presses, production operators pass steel through either of the two tunnels formed by the open jaws of six presses operating in series and ejecting stampings ready for subassembly, painting and assembly to units.

Meanwhile, another production control crew is

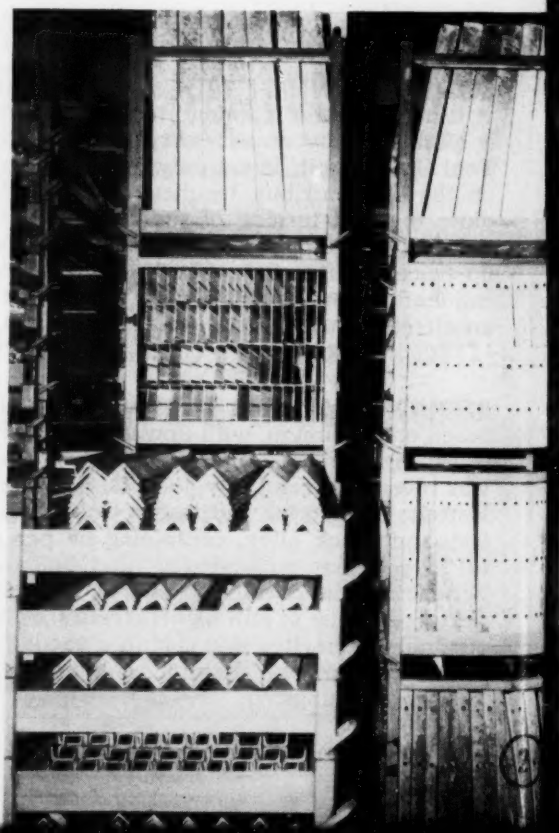


Fig. 1—Sheet feeding tables designed for large dimension unit loads of sheet steel permit operators to maintain sheet stock level with table of shear

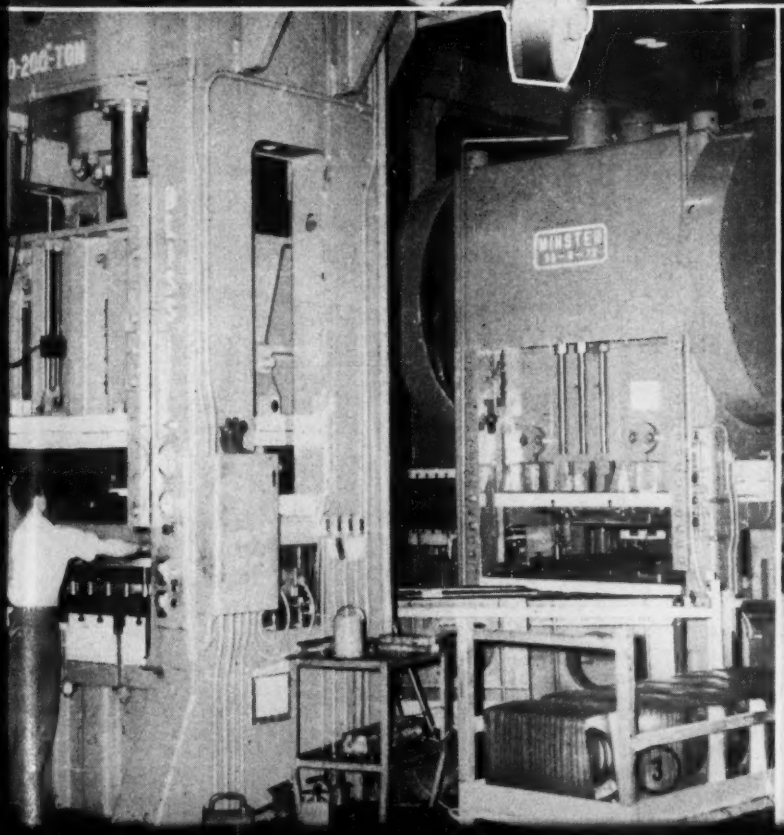
Fig. 2—Bulk of steel stampings and miscellaneous large steel items are handled and stored in basic section racks. Smaller material is stored in steel tote boxes and stackbins

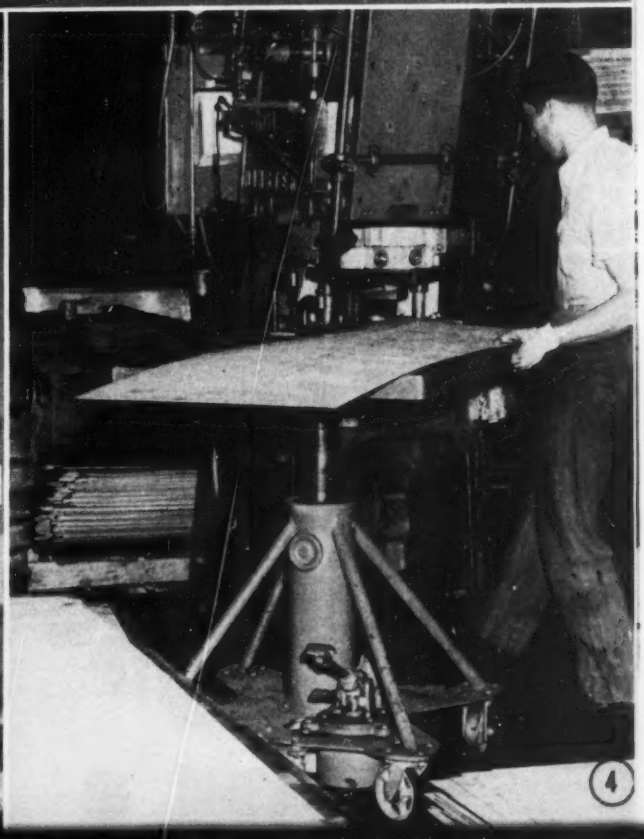
Fig. 3—Material is fed in pallet loads to large presses which are operated singly or in series. Finished stampings are placed in racking equipment by production employees

Fig. 4—Punching and braking of sheet steel is facilitated by use of portable tables equipped with hydraulically-operated platforms

EL HANDLING *Smoothes Production*

By DONALD W. PENNOCK
Carrier Corp.
Syracuse, N. Y.





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transporting smaller shear stock by pallet, steel tote box and stackbin to portable presses and brakes by means of cross-bay industrial fork trucks and spotting the unit loads on the floor or on small hydraulically elevated feed tables. Production operators process all parts and load stampings into unit load handling equipment in accordance with material handling instruction sheets specifying manner of loading and number of parts per piece of equipment. As final press shop operations are completed on material originally consigned on pallets, specially constructed basic section racks having removable end frames, side bars and dunnage, replace the pallets which are returned to shears.

Storage and Interplant Handling—The standardized unit rack, tote box and stackbin loads of stampings are consigned to either the plant's production control crib or are routed via over-the-road trucks to similar cribs in Carrier's factory near the center of Syracuse.

At the Thompson Road plant, unit loads of material are fed by production control crane operators to the plant's aisleless production area by Carrier's specially designed remotely controlled automatic grab equipment. In the multistory Syracuse plant, the material is delivered by control from floor cribs to production areas by two fleets of equipment. The major fleet is an industrial truck fleet equipped with special forks to move unit load equipment and cycle dollies directly to subassembly and assembly areas. The second is a fleet of the above-mentioned cycle dollies consisting of manually propelled shelf trucks on which all the parts to be assembled in a given production station during a shift can be delivered when this action is considered more desirable than placing unit loads of each part in the assembly areas.

Assembly Operations—In both plants steel parts in process of assembly are moved between stations usually by means of floor-mounted roller and belt conveyors. Production men remove the parts from unit load equipment spotted by control. Occasional production intradepartmental handling and rearrangement of unit load equipment is accomplished by production employees using powered and manually operated hand pallet fork trucks. In the Syracuse plant, the mechanical systems for feeding steel parts to high production floor conveyorized stations is supplemented by overhead monorail and chain equipment for delivering painted parts to stations in co-ordination with production line speeds. Upon crating the finished goods, shipping crews assume the handling functions and by means of crane-box grab systems integrated with fork truck-pallet systems move goods through temporary storage areas and into waiting interstate transportation.

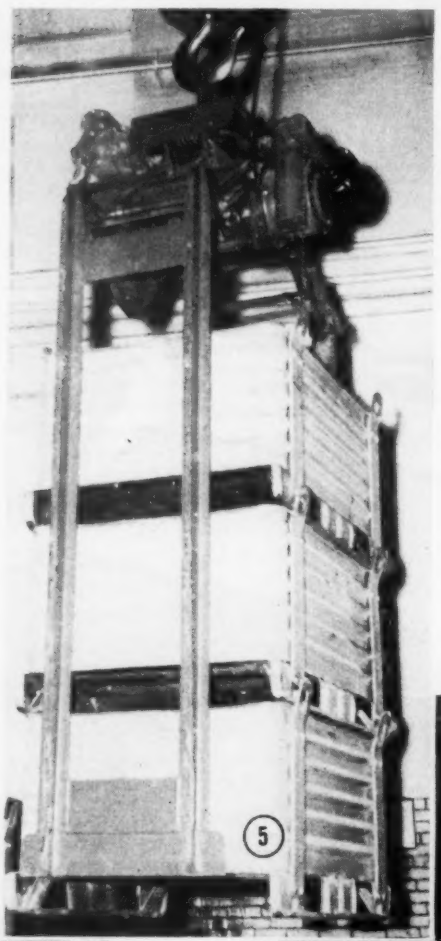
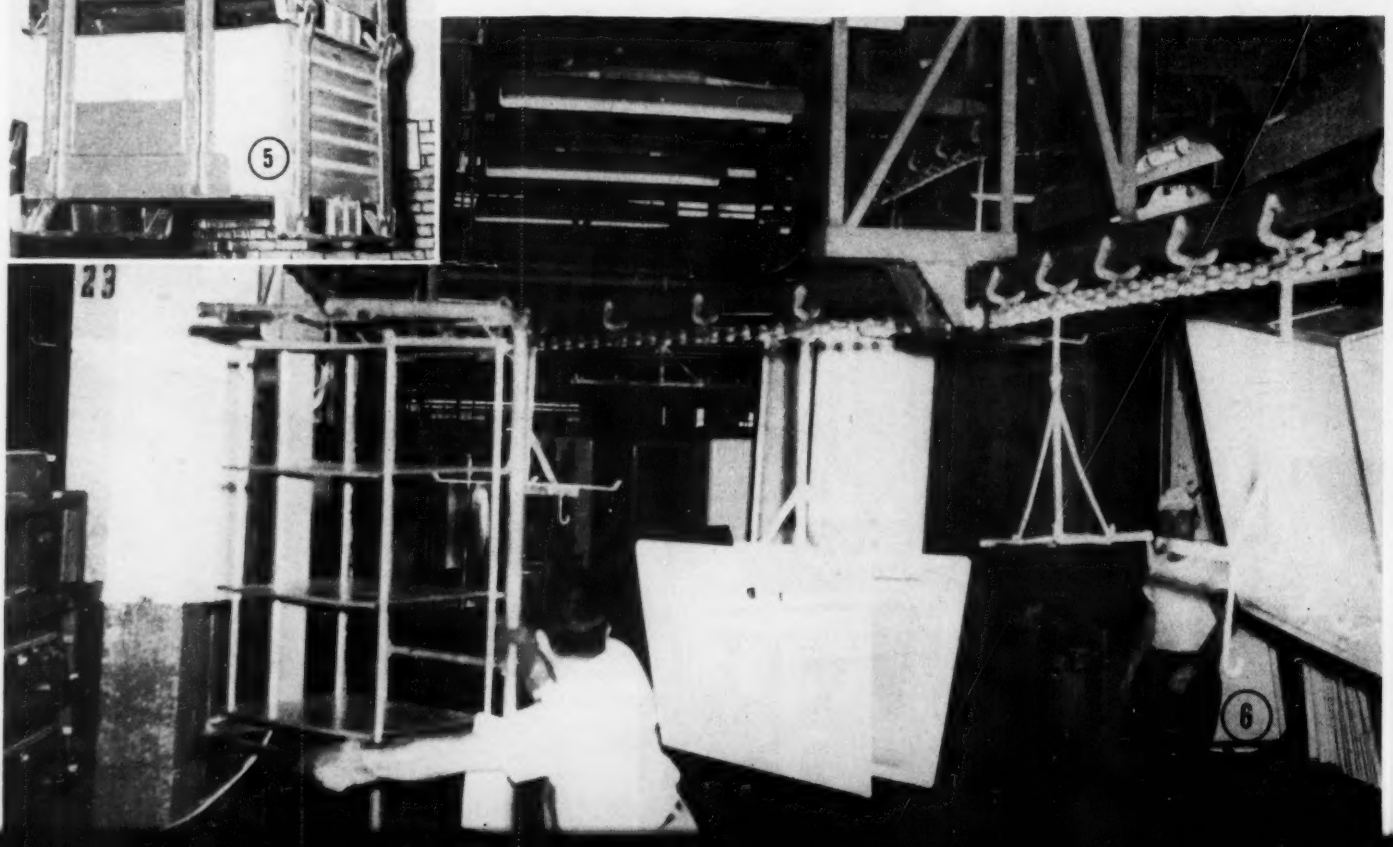


Fig. 5—Automatic grab remotely controlled by crane operator handles unit loads of material in the Thompson Road plant's aisleless production area for large industrial units

Fig. 6 — Overhead equipment moves painted sheet steel stampings and subassemblies into production stations building food freezers while subassemblies of refrigerating systems and contact plates for these products roll along floor roller conveyor lines to assembly stations



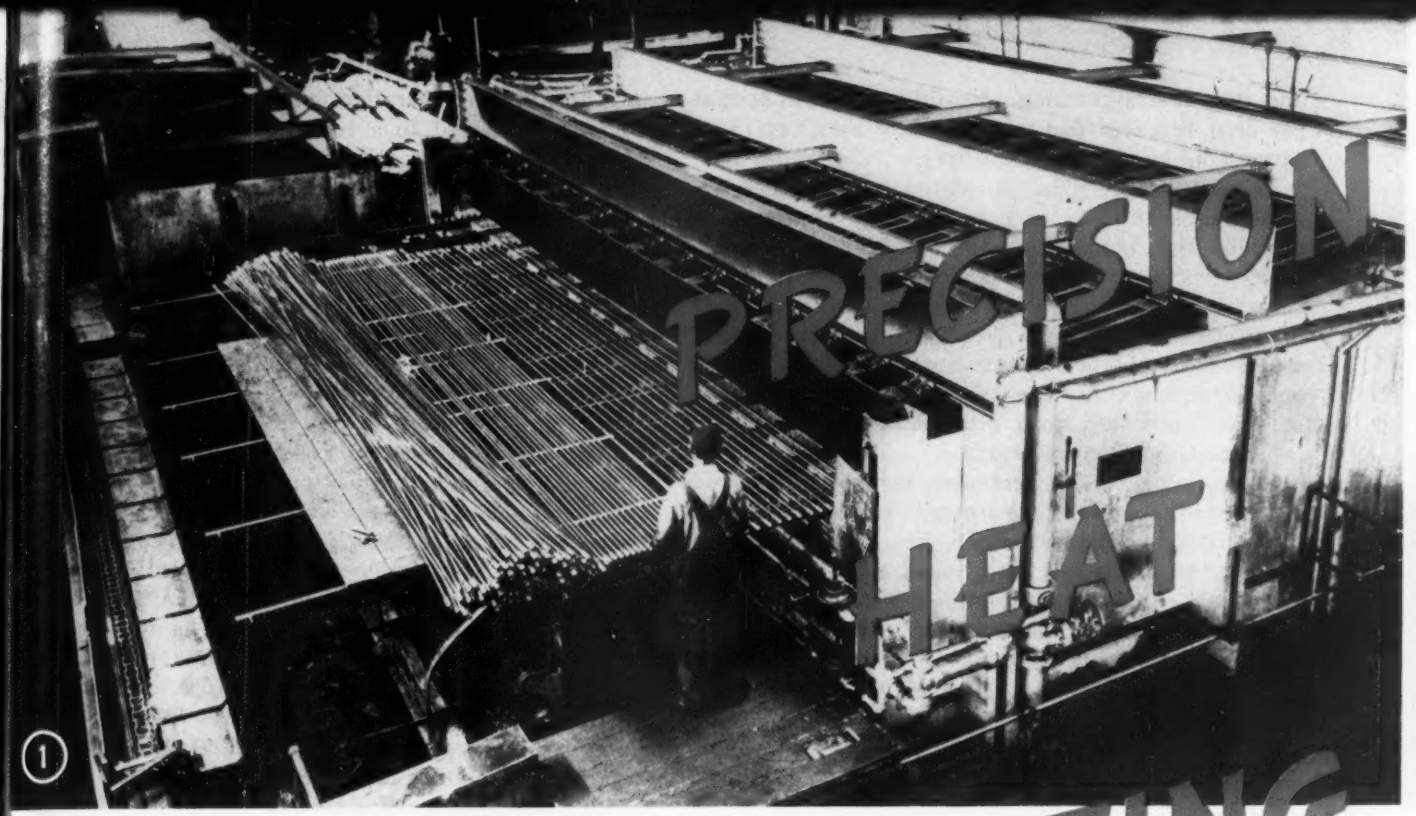


Fig. 1—Full length normalizing is the first of three steps in the treating process which produces sucker rods of maximum strength and endurance. In this special gas furnace rods are heated full length

Oil Well "Sucker Rods"

Varied conditions encountered in pumping deeper wells require strong rods produced under strictest metallurgical supervision

SPEED and efficiency with which oil is pumped from a well depends largely on the strength and exactness of steel tendons, called "sucker rods," which actuate the subsurface pumps, which, in turn, lift the oil from deep within the earth to the surface. Sucker rods must be capable of carrying loads up to 45,000 psi, while resisting powerful corrosive elements. They must, at the same time, be of the smallest possible diameter, for their size greatly affects the cost of oil production. The smaller the rod, the more space left for the oil inside the tubing through which it is pumped, and the faster the pumping process. Small diameter rods also require smaller and less expensive surface machinery to power them.

Oil Well Supply Co., U. S. Steel subsidiary with headquarters in Dallas, Texas has some of the most highly developed sucker-rod manufacturing facilities in the United States at its Imperial Works at Oil City, Pa. These rods are made from carbon and high-alloy steel and are precision heat-treated for maximum strength and endurance.

The sucker rod industry was revolutionized in 1908 with an all-steel integral-joint rod which is the basic design still in use. Previously rods had been made of wood connected by wrought iron rings. The all-steel rod made of soft steel rounds was good for shallow wells. This rod served the purpose for about 20 years. When a tougher rod was demanded, Oil Well undertook to produce the first fully heat-treated carbon-steel rod. The improved method includes specially designed equipment to control heating, cooling and drawing.

Rods must be absolutely uniform in quality throughout their entire lengths and must shoulder perfectly at the connection, or joint. Under the heavy tension to which the string is subjected, the slightest defect can cause concentration of stress at that point. A break in the string will occur prematurely at the excessive stress point and lead to a costly, tedious "fishing" job. Like a chain, a sucker rod string is no stronger than its weakest rod or weakest connection. Equally important in the rod's life is resistance to corrosion.

All rod blanks are obtained from Carnegie-Illinois Steel Corp. Only blanks of fine-grained carbon and alloy steels are used. Manufacturing process begins with forging the ends. Ends of the blanks are subjected to five separate forging operations to form full-strength pins. The least variation from specifications can weaken the pin. Blank ends are heated twice during the forging operations.

Precise Heat Treating—Only through precise and complete heat treatment can a rod be conditioned to meet the shock, fatigue and corrosion of present-day oil production. After the pin forging, rods are given triple heat treatment over their entire length by an exclusive process consisting of normalizing, quenching

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and stretch-straightening. Heating is done in special gas-fired furnaces and automatically controlled throughout by electric pyrometers.

In normalizing, rods are placed in a furnace designed to heat them over their entire lengths to a specified high temperature to create a finer, uniform grain structure. After being held at that temperature for a prescribed time they are allowed to cool in open air. This first treatment strengthens the steel considerably. For less severe pumping service normalized rods are adequate. But for the higher pumping loads only rods with additional heat treatment are of sufficient strength.

In the second heat treatment, the normalized rod is reheated to a high temperature for added strength by further reducing the grain size. At the precise instant, the rod is quickly plunged end-to-end into a quenching bath to capture the desired grain structure. Recording pyrometers govern the temperature of the steel and quenching fluid.

Third heating operation is stretch-straightening, or drawing. Heated to a temperature just below that which would modify the grain structure, the rods are placed in another specially designed machine which smooths out any bends that might have occurred in the first two heat treatments then stretches each rod a fraction beyond the elastic limit to achieve perfect straightness. To retain the straightness they are held at this point under a given tension while cooling. Simultaneously, rods are individually tested to make certain no defects have resulted from the forging and heat-treating operations.

Threading—When cool, rods are ready for threading, the final step in their production. For greatest strength in a string, pin threading must be of such accuracy that connecting joints will line up perfectly. Rods are automatically machine-threaded to American Petroleum Institute specifications. A swirling oil coolant prevents any abrupt change in temperature that would nullify the heat treatment they have undergone by altering the grain structure. With A.P.I. and special gages, threading receives closest inspection. To insure perfect alignment when a string is made up, couplings are threaded their entire length, with a single continuous thread.

In every phase of manufacture, sucker rods are subjected to rigid inspection and samples are constantly referred for successive check to laboratories equipped to analyze physical properties of metals, run endurance tests, determine stress distribution, test shock resistance and check forging and threading.

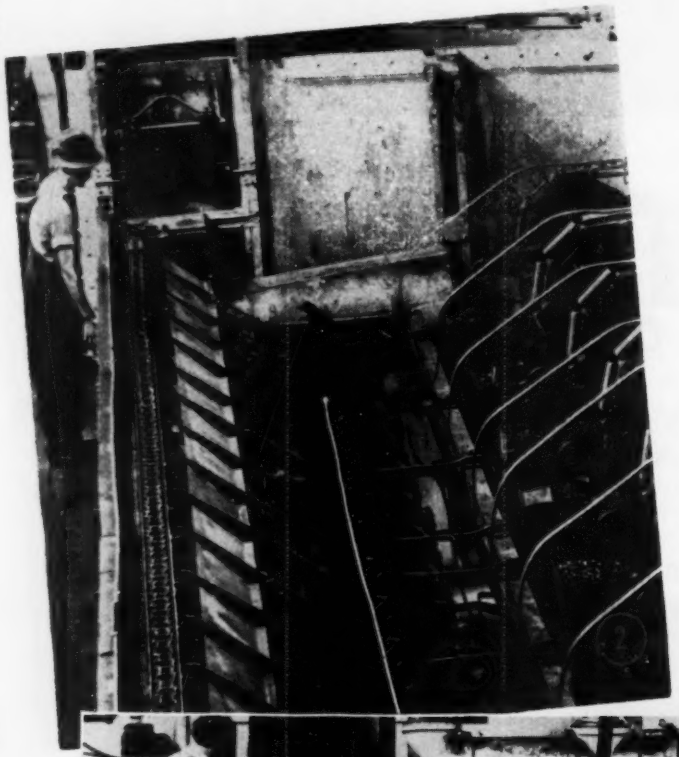

Fig. 2—After normalizing, sucker rods are reheated to a high temperature which increases their strength by further reducing grain size. At the precise instant, rods are plunged end-to-end into this quenching bath for the desired grain structure.

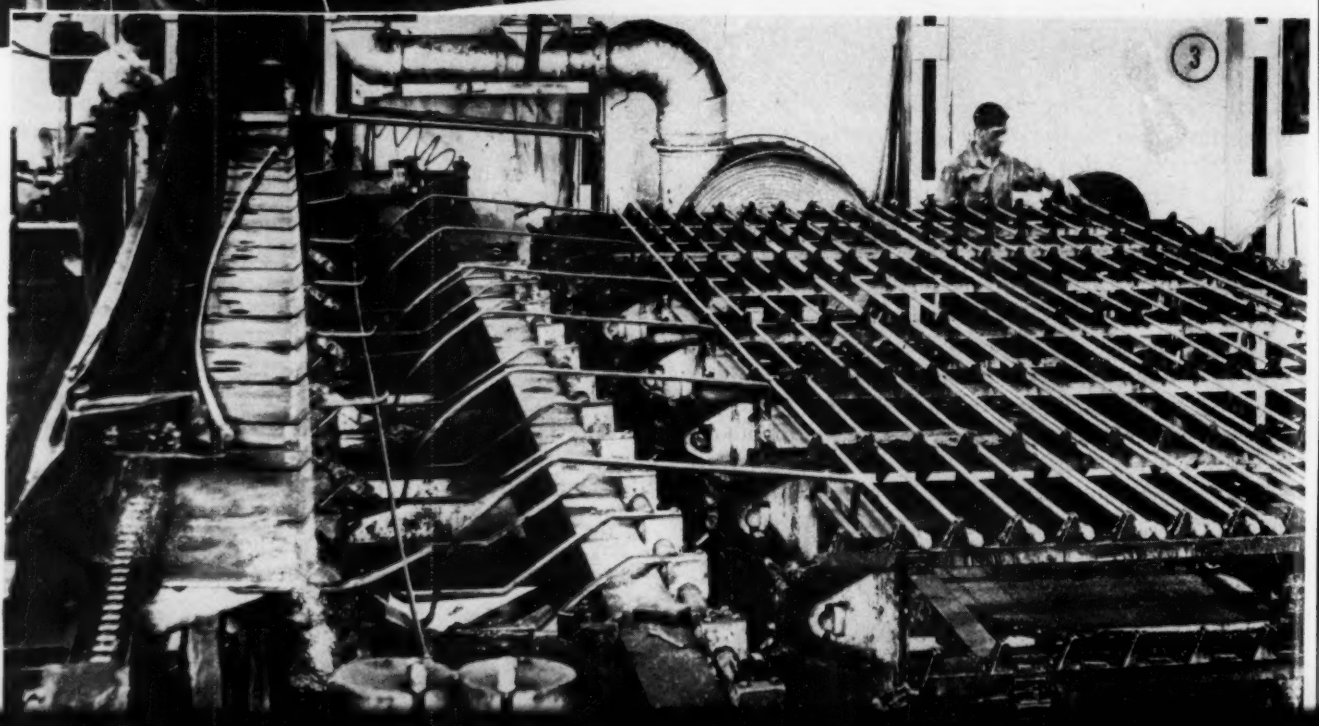

Fig. 3—In the third heat treating, sucker rods are heated to a temperature just below that which would modify the grain structure, then "stretch-straightened," or drawn, in this specially-designed machine which removes bends occurring during the preceding heating and stretches the rods a fraction beyond the elastic limit to produce perfect straightness

164 Welds in 32 Seconds

. . . made on steel house truss, using 44-gun automatic multiple-spot welding unit

Fig. 1—Half-truss used in steel homes

ADAPTED from designs of automatic multiple-spot welding machines used widely throughout the automotive and refrigeration industries, a 35-ton multiple-transformer unit with 34 transformers and 68 welding guns recently was built for assembly of half-trusses used in steel homes manufactured by Lustron Corp., Columbus, O. Machine cycle is only 32 seconds, during which time 44 of the welding guns index to permit making a total of 164 welds on the flanges of the truss chords and inclined member.

Fig. 1 shows one half-trusses, comprising 22 members for final assembly. Verticals, diagonals and corner plates are built up by spot welding before being placed in the fixture which carries the assembly into the automatic welder. As first designed the fixture was to be carried into the welder on an overhead track, so a wood model of the machine was built up, as illustrated, embodying this principle.

Later it was decided to move the loaded fixture to the machine on a roller conveyor, and then pull it into place between the triangular frames carrying the welding guns by means of a dog traveling on a 26 foot lead screw at the center of the machine base. When the truss is in position the entire frame on each side traverses inward hydraulically until the guns are in position for welding. Sequence of firing is controlled either automatically or by actuation of pushbuttons on a master control table, activating hydraulic pressure to the guns, Fig. 2.

When fully assembled and in operation at Lustron, the welder, its fixtures and conveyor system will be approximately 200 feet long, making it probably the largest automatic multiple-spot welding machine ever constructed for this type of work. At 100 per cent efficiency,the machine will produce 72 truss sections per hour, a rate unheard of in the prefabricated building industry where this type of work is now done by manually operated welding guns. Cost of the automatic installation, designed and built by Multi-Hydromatic Welding & Mfg. Co., Detroit, is well in excess of $100,000.

This company was organized in 1930 by H. G. Warnke, now executive vice president, who designed and built what was probably the first "hydromatic," or multiple gun, welder. The machine worked essentially in the same manner as the spark distributor on an automobile engine in relation to the spark plugs. The hydromatic unit or distributor forces oil to fire the welding guns on a rotation basis, permitting mutiple welds within a short space of time. The principle immediately found a wide market in the automotive industry, where rapid spot welding of sheet metal sections meant great savings in cost.

In 1938, Warnke developed the multiple-transformer welder, which has proved superior to his earlier design. By the newer method, up to four welding guns can be fired from one transformer at one time. Depending upon the amount of power available, any number of transformers can be energized.

In the Lustron truss, it will be noted there are two horizontal members or chords, separated by vertical spacers. When installed the upper member is covered on under side, and the enameled steel ceiling panels are hung from the lower member, forming an enclosed space into which heat is introduced and radiated from the ceiling panels into the house. Each house requires 10 full trusses or 20 half trusses.

Fig. 2—Thirty-five-ton multiple transformer welding unit used to assemble half-trusses

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PLASTIC FLOW IN *Forming*

IN drawing and cold working steel, many principles regarding the flow of metals are used which are the result of continued experience rather than organized knowledge of the mechanical properties of metals in the plastic condition. Generally, therefore, die design and the technique of handling steel in them is worked out by cut and try methods. As a consequence, the selection of steel, with especial reference to the specified gage, is a question of the ramifications of the variables having to do with the relation-

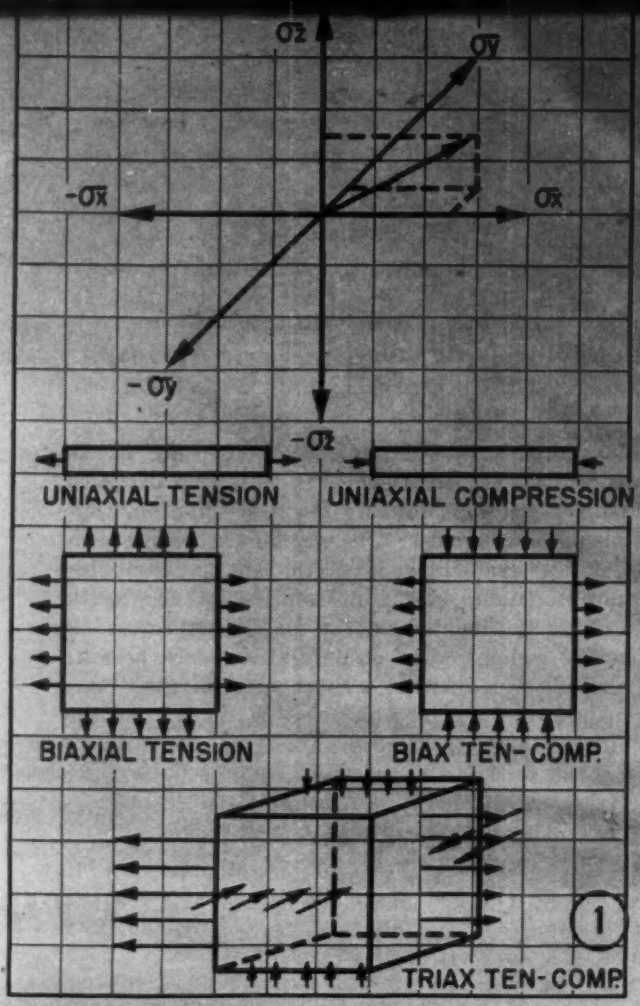


Fig. 1—All possible states of stress may be referred to three mutually perpendicular axes

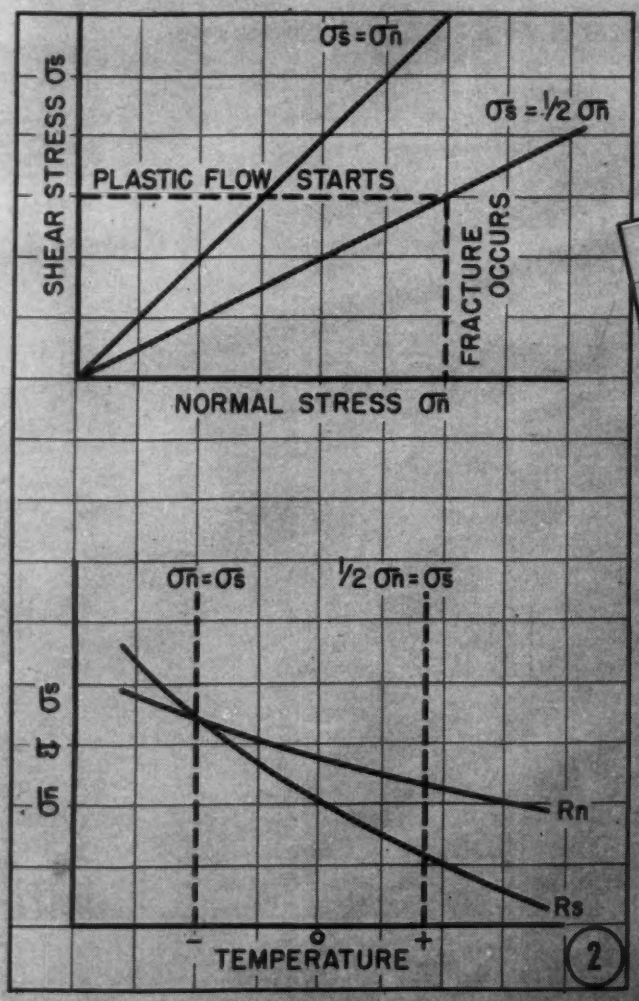
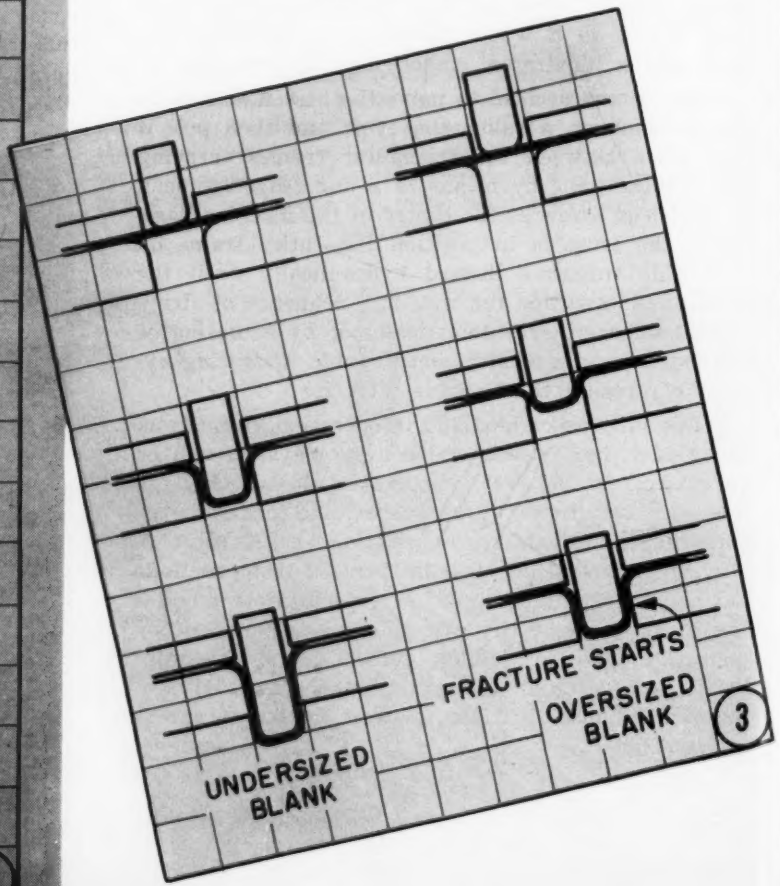


Fig. 2—How factors R_n and R_s vary with temperature, speed of deformation and cold work

Fig. 3—Depending upon the size of punch and to a lesser extent upon the geometry of the punch, there is a maximum diameter of blank which can be drawn through the die



g and Drawing Metals

Interest in this critical analysis of the drawability of metals is heightened by modern developments such as cold forming, in working high strength steels. Relationship of die contours to characteristics of the metal is discussed as well as the utility and futility of common tests used in estimating the drawability of steel and other metals

By C. L. ALTENBURGER
Great Lakes Steel Corp.
Detroit

ship of die to steel rather than upon considerations of the mechanical properties of steel as determined by the usual laboratory tests.

Consequently, in developing dies against an approximately constant steel characteristic, progress is made by die and gage modification until success is attained. Any major change in steel characteristics is likely to involve some change in die contours or techniques.

Among the common tests used in estimating the drawability of steel and other metals are tensile elongations, Olsen cup tests and hardness measurements often in conjunction with microscopic examinations for grain size, uniformity and segregations. Frequently macro-examinations by deep etching is resorted to. These tests and examinations are statistically but not necessarily related. By experience it is known that on critical parts, mechanical tests may indicate that the material should be satisfactory based upon prior calibration, large percentages of breakage occur when the microstructure or macrostructure is unsatisfactory. The converse also happens.

Statistical Correlations—Because of statistical correlations and because the ordinary mechanical tests can be statistically correlated with performance, conclusions have been made that the property measured actually defined the capacity of the metal to be drawn. Tensile tests and cupping tests are in themselves types of drawing operations and as such are but isolated members of an infinite variety of cold forming processes which may or may not be interrelated. An example shown in Table I will make this clear.

Materials tabulated therein vary nearly six fold in yield strength and tensile strength and nearly twelve fold in elongation as determined across a 2-inch gage length on ½-inch wide specimens. The last two columns show the maximum results in forming cylinders from circular blanks expressed as the ratio of maximum blank diameter to punch diameter, and as per cent reduction which is the percentage change in blank circumference and punch circumference (or what amounts to the same thing—blank diameter and punch diameter). It will be evident that the numbers representing physical properties bear no real relationship to the drawability of the metal as measured by the capacity of the various metals to be drawn into cylindrical cups.

If the ability to draw cylindrical cups be looked upon as a measure of ductility (which it is not) then tensile ductility and "cylindrical cup" ductility are not the same thing. Or if the tensile tests are regarded as a drawing operation the capacity of the metals to be drawn varies with the type of drawing operation and their capacity to be drawn in the one case does not predetermine their capacity to be drawn in the other. This will be discussed in greater detail later.

States of Stress—All possible states of stress may be referred to three mutually perpendicular axes, as shown in the upper portion of Fig. 1. The axes represent principal stresses, plus values representing tensile stresses and negative signs represent compressive stresses. A point lying on the line σ_x represents a tensile stress in one direction, as in a tensile bar, and is called uniaxial tension. A point lying on the line σ_x represents a uniaxial compression. A point contained in the plane σ_z, σ_x represents a biaxial tension wherein two stresses are applied simultaneously at right angles to each other. Thus any number of combinations of stress can be defined by a point contained in the space diagram.

The question arises as to the influence of various combinations of stress upon the ability of a material to deform plastically. Such materials as calcite, which can be crushed to a powder with a mortar and pestle can be made to exhibit considerable flow in the laboratory under certain combinations of tension and compression. Similarly with gray iron which exhibits little or no ductility in tension. Theoretically all materials must fail in a perfectly brittle manner under balanced triaxial tensions, strains being elastic up to the point of fracture. Under equal triaxial compressions, materials are elastic up to the highest pressures recorded. Failure under such stress distributions has not been observed unless the material is porous.

Since metals flow under shearing stresses and fracture due to normal stresses, where normal stress is that stress perpendicular to the plane of fracture,

From data presented by the author before the SAE National Passenger Car, Body and Production Meeting, Detroit, Mar. 8-10, 1949.

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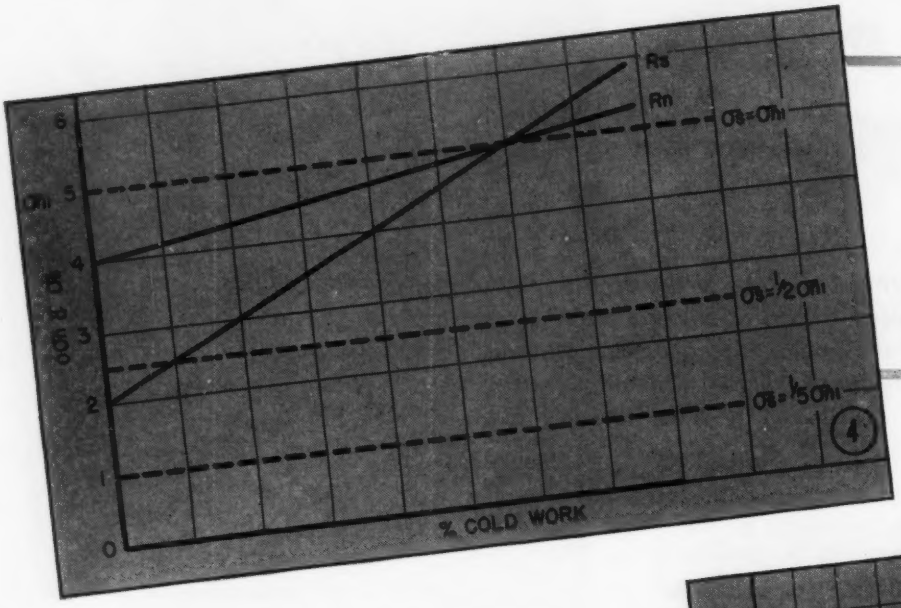


Fig. 4—During a drawing operation both R_n and R_s vary with progress of the draw

Fig. 5 — Stress-strain diagrams covering a range of various metals of low to high strength materials

Fig. 6—Relation for NAX high tensile steel

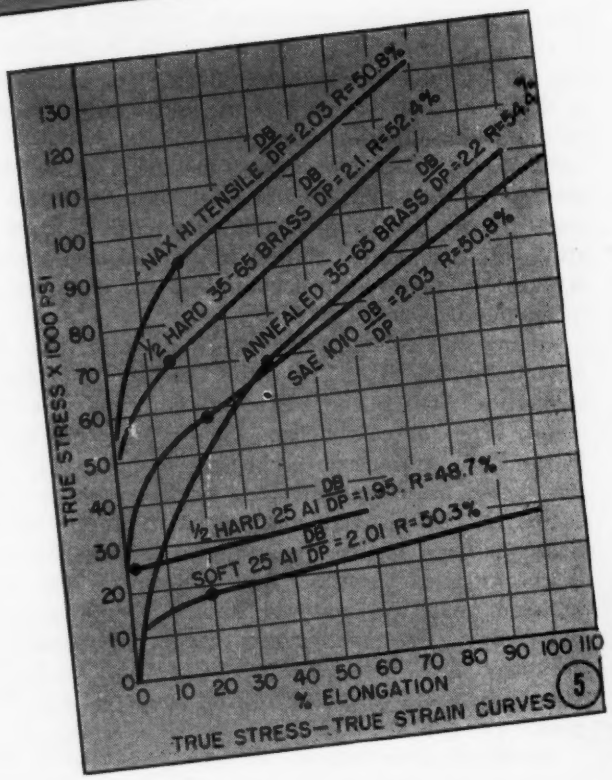
the ratio of shear to normal stress applied becomes a measure of the relative ability to draw a given metal, inasmuch as different metals vary in their ability to resist shear and normal stresses, the ratio of their resistance to flow by shear and their resistance to fracture due to normal stresses is a measure of the relative capacity of different metals to be drawn under a given set of conditions. These statements can be combined symbolically. Thus if

σ_s = imposed shearing stress.
σ_n = imposed normal stress.
R_s = resistance of the metal to flow in shear.
R_n = resistance of the metal to part due to normal forces.

Then
σ_s/σ_n R_n/R_s is a factor which is related to flowability. If external conditions be kept constant, i.e., if σ_s/σ_n = K = constant, measurements of R_n/R_s for different metals should place them in the order of their drawability.

As an example, gray iron in tension exhibits no ductility because its resistance to σ_n is less than its resistance to the resultant shear stress, which is ½ σ_n. When compressions are placed at right angles to a tension so that σ_s is increased without increasing σ_n it can be made to flow somewhat. Its resistance to shear is thus greater than ½ σ_n but less than σ_n.

Shearing Stress Varies—In Table II is shown how the resulting shearing stress varies with the type of stress introduced. Maximum resulting shearing stress is always equal to one-half the difference between the maximum and minimum principal stresses. Consequently, the possibilities are enormous. Practical examples from industry of the use of favorable stress distributions are not lacking. We have in mind a case where N-A-X high tensile steel has been cold reduced 92 per cent in a Steckel mill without intermediate anneals. This involves an extension or an elongation of 1250 per cent. There is involved here a heavy compression at right angles to a tension. Limiting factors are mill capacities and strength factors rather than ductility as ordinarily measured.


TRUE STRESS X 1000 PSI
NAX HI TENSILE DB/DP=2.03 R=50.8%
½ HARD 35-65 BRASS DB/DP=2.1 R=52.4%
ANNEALED 35-65 BRASS DB/DP=2.2
SAE 1010 DB/DP=2.03 R=50.8%
½ HARD 25 Al DB/DP=1.95, R=48.7%
SOFT 25 Al DB/DP=2.01 R=50.3%
% ELONGATION
TRUE STRESS—TRUE STRAIN CURVES
5

Of interest is how the factors R_n and R_s vary with temperature, speed of deformation and cold work. By reference to Fig. 2, schematic diagrams taken from Maxwell Gensamer's *Strength of Metals Under Combined Stresses,* note that in the upper diagram fracture occurs precisely at the initiation of plastic flow where σ_s = ½ σ_n. The material here might be cast iron; the mechanical properties such that σ_s = σ_n plastic flow starts before the fracture stress is attained and the material exhibits ductility. In the bottom diagram the material will begin to exhibit brittleness at a temperature where R_s = ½ R_n for a stress system such that σ_s = ½ σ_n. For stress systems such that σ_s = σ_n the critical temperature at which brittleness ensues is lower. The effect of velocity of deformation is similar to that of temperature-increasing velocities being analogous to lowered temperatures.

During a drawing operation both R_n and R_s vary with the progress of the draw, i.e. with cold work.

TABLE I

Material	APPROXIMATE PHYSICALS Y.S.	T.S.	Actual Maximum Elongation	*BD/PD	% Reduction
Extra Deep Draw Steel....	28,000	41,000	46	2.03	50.8
SAE 1010 Anneal	31,000	47,300	44	2.03	50.8
Aluminum 2S	9,000	13,300	36	2.02	50.5
N-A-X High Tensile	52,000	75,000	30	2.00	50.0
Half hard Al.	22,000	24,000	4	1.96	49.0

*BD Blank diameter
PD Punch diameter

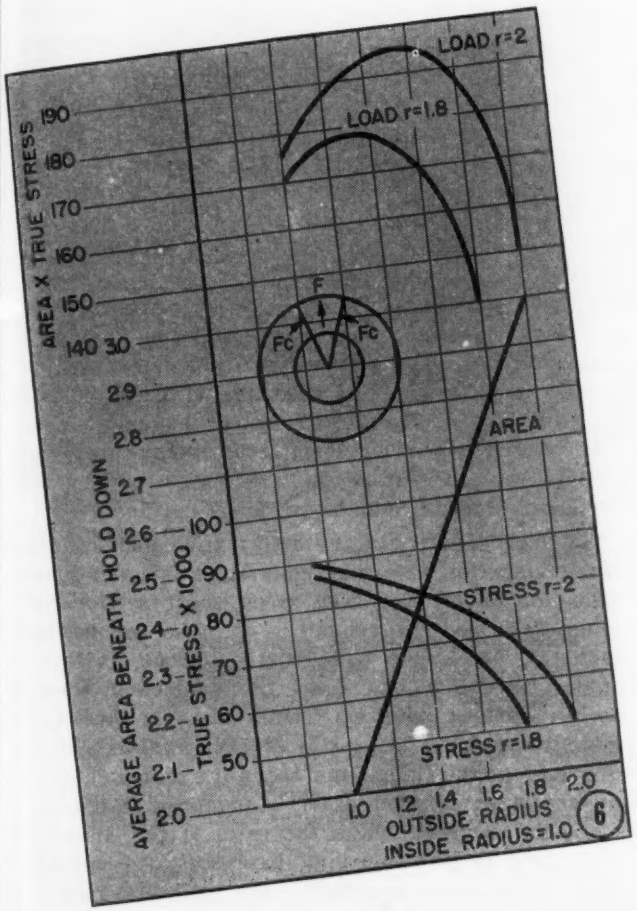
TABLE II
HOW RESULTING SHEARING STRESS VARIES WITH TYPE OF STRESS DISTRIBUTION

Type of Stress	Algebraic Notation of Type of Stress		Resulting Shearing Stress
Pure Tension	$\sigma_x + 0,$	$\sigma_y = \sigma_z = 0$	$\frac{1}{2}\sigma_x$
Pure Compression	$-\sigma_x + 0,$	$\sigma_y = \sigma_z = 0$	$-\frac{1}{2}\sigma_x$
Balanced Biax. Ten.	$\sigma_x = \sigma_y$	$\sigma_z = 0$	$\frac{1}{2}\sigma_x$ & $\frac{1}{2}\sigma_y$
Bal. Biax. Ten-Comp.	$\sigma_x = -\sigma_y$	$\sigma_z = 0$	σ_x
Unbal. Biax. Ten-Comp.	$\sigma_x = -1/3,$	$\sigma_y = \sigma_z = 0$	$2\sigma_x$
Triaxial Tension	$\sigma_x = \sigma_y = \sigma_z$		0

In the schematic diagram of Fig. 4 for the material defined therein by the solid lines marked R_n and R_s, no plastic flow can occur under a set of imposed stress such that $\sigma_s - 1/5\ \sigma_n$ since R_s exceeds σ_s; also for this condition since σ_n exceeds R_n the material will fracture in a brittle manner as the applied stress approaches R_n in magnitude. For the case where $\sigma_s - \frac{1}{2}\ \sigma_n$, $R_s - \frac{1}{2}R_n$ at 0 per cent cold work, hence the onset of plastic flow and fracture are coincident; any attempt to increase the shearing stress by increasing normal stress will result in fracture. In the case where $\sigma_s = \sigma_n$ plastic flow will proceed until $\sigma_n = R_n$ at which level fracture will occur.

Integration of the factors enumerated above and their variation from sheet to sheet, or within a single sheet, can be called "formability" or "'drawability" for convenience.

Drawing a Cylindrical Cup—Consider the drawing of a cylindrical cup from circular blanks. Depending upon the size of the punch and to a lesser extent upon the geometry of the punch, there is a maximum diameter of blank which can be drawn through the die. If this maximum size blank is exceeded, the blank moves underneath the hold down but very little. Such movement as does occur is insufficient to exceed the yield strength of the metal materially. In this event the metal deforms as shown in Fig. 3. until the bottom is punched out. At the critical blank size the metal around the punch deforms up to the tensile strength of the cup wall after which deformation the metal beneath the hold down moves into the die.



At blank diameters less than the critical blank size the stresses in the cup wall do not attain the tensile strength of the metal, some deformation taking place in the cup wall, but most of the deformation taking place by contraction of the circumference of the blank underneath the hold down. By analyzing the forces involved, it being evident that the tensile forces in the cup wall must balance the resistance to compression of the metal beneath the hold down the following formula may be derived:

$$T\,(2\,\Pi\,r_o\,t) = Y\,\frac{(2\,\Pi\,r_1 + 2\,\Pi\,r_o)}{2}\,t + 2u\,(\Pi\,r_1^2 - \Pi\,r_o^2)\,P_H$$

where

t = the thickness of the metal.
T = tensile strength of cup wall in psi
r_o = radius of punch plus gage.
Y = yield strength in compression psi
r_1 = critical blank radius.
u = coefficient of friction beneath the hold downs.
P_H = pressure of the hold downs psi required to prevent wrinkling.

Using this formula, the critical blank diameter is calculated for both mild steel and high tensile steel and have gotten values for r_1/r_o of 1.96 and 2.06 respectively. Experimentally the determinations in both cases were 2.0 and 2.03. Such factors as punch radius and radius at the lip of the die were in excess of $\frac{1}{4}$-inch, using a 1.87-inch diameter punch. Hold down pads were finely polished so that die and punch design variables were reduced to a minimum. While the above close agreement between theory and experiment may be fortuitous, there is no doubt in our minds that the essential variables are contained in the above formula. Both steels above contained a pronounced yield point.

Where metals are used which do not possess a sharp yield point, some point on the stress-strain

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diagram corresponding to the slight deformation beneath the hold down at the critical blank diameter should be used. Where radii of punch and die are smaller than those cited above, the critical blank diameter is smaller. Insofar as the formula is concerned, the force required to bend the metal over the lip of the die and around the punch plus the added friction must be added to the right hand side of the equation.

Actual Deformation—Actual deformation of the metal is greatly in excess of those predictable by common tests. It will be noted that the actual stresses beneath the hold down is compression at right angles to a tension, which is favorable to formability. By employing two, three or more operations, the deformation of the metal can be further greatly increased. When the ratio of blank diameter to punch diameter is 2, the reduction is 50 per cent. In multistage operations where for instance consecutive reductions of 45 per cent, 20 per cent and 20 per cent is employed, the over all reduction is 64.8 per cent.

Consider the true stress-strain diagrams shown in Fig. 5. Curves cover a range of various metals of low to high strength materials. The solid circle on each curve represents maximum load and uniform elongation. The top end of each curve represents the fracture stress and the elongation at the point of fracture. The curves are identified by material and further by DB/DP (maximum diameter of blank divided by diameter of punch) and by the per cent reduction in the drawing of cylindrical shells (DB − DP)/DB 100.

At a glance it will be evident that the shallower the curvature up to the maximum load, the greater the ratio DB/DP and the greater R = DB − DP/DB. The reason for this can be made evident by reference to Fig. 6 worked out for N-A-X high tensile steel. The straight line marked "Area" is the average area normal to the force F and is equal to ($\Pi r_i + \Pi r_o$) T where

r_i = outside radius
r_o = inside radius
t = thickness

In the abscissae, the factor t is not included. The above arithmetic mean area is not absolutely correct. The correct area is the logarithmic mean area $2\Pi r_i - 2\Pi r_o/2.3 \text{ LOG } r_i/r_o$ but is satisfactory up to $r_i/r_o = 2$ at which the difference is less than 4 per cent.

Employing the data from the curve marked "Area" the per cent reduction can be calculated for each deformation as the blank slips beneath the hold down. As an example, when the blank moves toward the punch from $r_1 = 2$ to $r_2 = 1.9$ the per cent reduction is (0.1)/2 100 = 5 per cent.

True Stress-Strain Diagram—Stress at this deformation can now be looked up on the true stress-strain diagram and plotted as shown for the curve marked stress R = 2 and stress r = 1.8 where the numbers refer to the outside radius of the blank prior to any deformation. By multiplying the average area by this stress the actual load due to the deformation underneath the draw rings is obtained, shown in the curves marked for starting blanks whose initial radius is 2 and 1.8 respectively. When the friction load is added to these values, the force equals the tensile force in the cup wall. When these additive forces are such as to equal or exceed the tensile strength of the cup wall the maximum size blank has been attained.

Now suppose that a given material can have shallow or steep true stress-strain curves up to the maximum load. With a steeper curve the maximum load shown for r = 2 is exceeded and the cup fails to draw, and the maximum blank size decreases. If at any point of the draw the true stress-strain curve is such that the remaining area multiplied by the stress exceeds 196,000, the cup will fail to draw and the maximum blank size is decreased. For shallower stress-strain curves, just the opposite is true.

Let us consider another simple drawing operation where the situation is radically different, such as the simple tension test. Here we have a case of uniaxial tension wherein the resulting shearing stress is one-half the normal stress, that is one-half the load divided by the cross-sectional area and directed at an angle of 45 degrees to the normal stress. In this case stretching takes place uniformly in the direction of the normal stress until the maximum load is reached; thereafter the load falls off, further deformation is localized to small areas; i.e. strain gradients exist and the stress system in the region of the strain gradients is no longer uniaxial but assumes more and more the aspects of triaxial stress distributions.

Where relatively short sections are to be extended in this wise both the local and uniform elongations are important in critical draws; but where long objects are to be extended the local elongation becomes of less and less significance as the length of the object to be drawn increases and the possible uniform elongation becomes controlling and not the total elongation as determined by conventional testing methods.

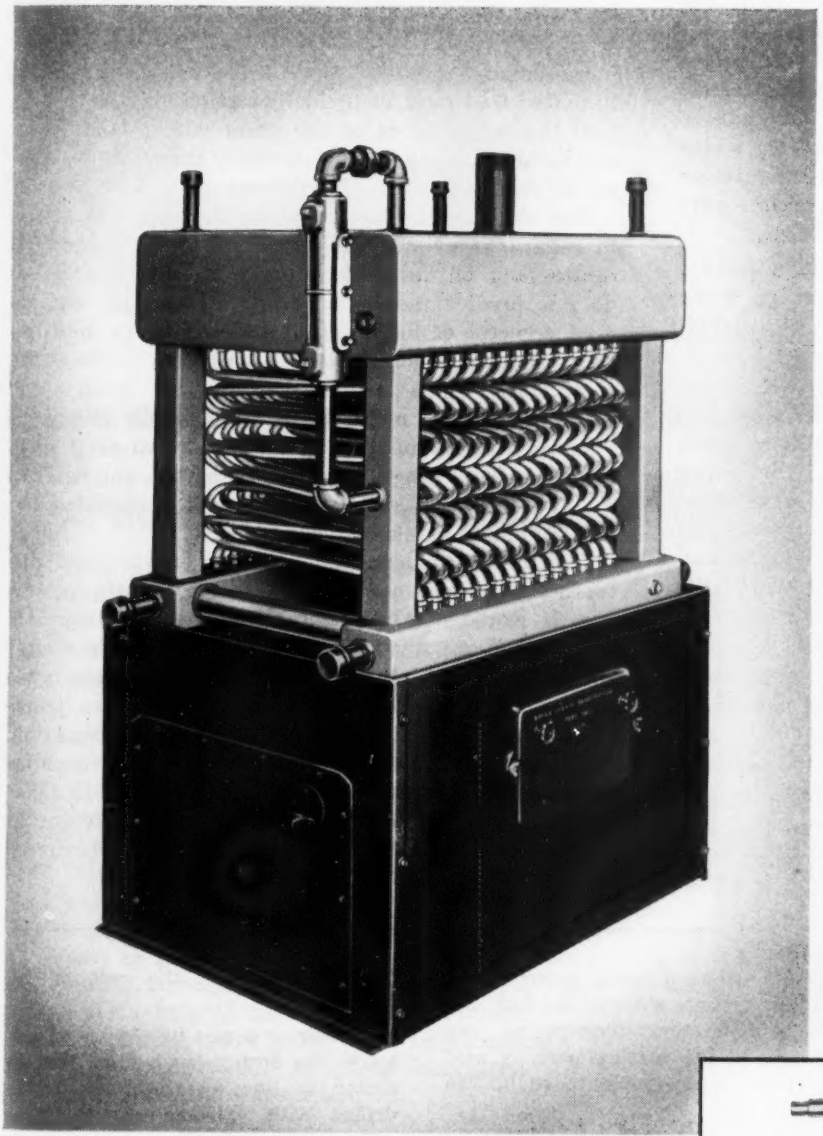
Consider further such cases where extensions in two mutually perpendicular directions are required. If the extensions are equal in amount the deformation is called balanced biaxial tension; if they are unequal in amount they are called unbalanced biaxial tension.

Biaxial Tensions—Generally greater uniform elongations are possible with biaxial tensions than with uniaxial tensions. However, the local elongation decreases more or less in accordance with the diagram shown in Fig. 6. The uniform extensions shown there are favored whenever such extensions take place along a curved surface due, we feel, to the stress gradients perpendicular to the sheet surface.

As the biaxiallity of the deformation increases the local elongation becomes negligibly small and ceases to be of importance even when short sections are to be deformed. In a number of cases the limiting factors depend upon boundary conditions, as for instance when a blanked edge is deformed in tension as in a burring operation. The ability of a sheet to be burred may be expressed by D_B/D_H where D_B is the diameter of the flange and D_H is the diameter of the punched hole, or when a hole is increased in diameter by radial stresses where the ratio of the diameters after and before enlarging expresses the deformation. When such boundaries are well prepared, as-

COPPER TUBE

A VITAL FEATURE OF BRYAN BOILERS



Bryan Steam Boiler with housing removed, showing copper tubes. Bryan claims 75 pounds of steam in 15 min. from cold start, due to high heat conductivity of the Revere tubes. Also made in low-pressure and hot water models.

THE big feature of the boilers made by the Bryan Steam Corp., Peru, Indiana, is that they use copper tubes. Another important item is engineered design to meet the requirements of the fuel, whether gas or oil. Let Bryan tell the story:

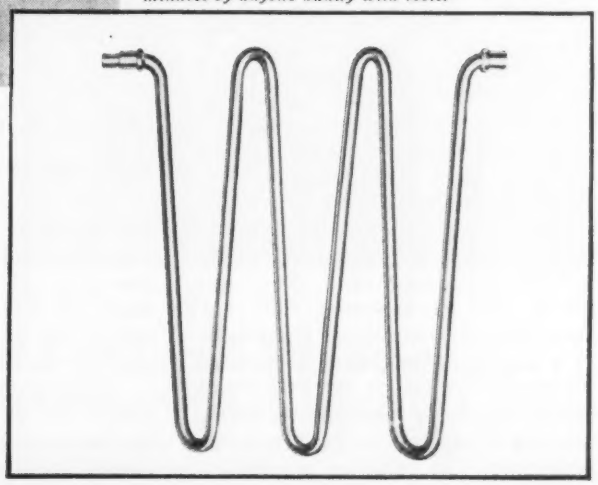
"The Bryan Copper Tube Boiler was started with a double-barreled idea. The first part of the idea was that boilers could be made more efficient by using copper tubes. Copper transfers heat many times as fast as cast iron or steel. Heat from a fire is transferred through copper tubes to water in record time, and in a Bryan Boiler with minimum heat loss through the flue due to the design.

"The second part of the idea was that if a boiler could be engineered expressly for gas or oil, the economy of operation would be such as to revolutionize the heating industry."

The first Bryan Boilers were a sensation when offered over 20 years ago. Today they are made in a number of sizes, from domestic types to 50 hp high-pressure units for industrial uses. Revere Copper Tube is used.

This is another illustration of a favorite Revere statement: "Copper is the metal of invention." Revere makes not only several types of copper tube, but also other copper and copper alloy mill products, and will be delighted to collaborate with you in such matters as selection of the most suitable metal, and fabrication methods to be employed.

Revere copper tube as fabricated by Bryan for boiler use. It is explosion-proof, because should it give after long service, water and steam escape harmlessly. A new tube can be installed in a few minutes by anyone handy with tools.



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tonishingly high values have been obtained. We have produced expanded holes whose diameter was 2.25 times the original diameter, which means an elongation of 125 per cent of the original circumference. Where the quality of the boundary falls off, such values cannot be attained so that with holes punched with dull punches or improper clearance or both; values as low as 10 per cent may not be exceeded.

In the light of the disclosures mentioned, a viewpoint in regard to the examinations of steels for deep drawing control can be arrived at. Inasmuch as the flowability of metals depends upon shearing deformation, it is evident that not only the magnitude of the imposed shearing forces must be considered, but also the resistance of steels to such shearing forces must be examined. More specifically localized resistance leading to localized flow or what amounts to the same thing, steep strain gradients occur, which lead to localized deformations, which in themselves may be high while the overall extension of the part may be too low to form the part successfully.

Banded Steel—Consider as an example a banded steel consisting of bands of ferrite and pearlite. When the chief deformation is transverse to the banding, deformation occurs largely in the ferrite because its resistance to shearing forces is low, the deformation is then localized and general extension is low. Wherever bending or bending plus tension enters into the operation, banding is of greater influence than in uniaxial tension because the stress gradient through the thickness resulting in the higher stresses on the outer fibers of the steel is certain to find a ferrite band which necks locally and starts the whole process of failure.

In pure tension where the stress is uniform across the section, local yielding is inhibited by adjacent pearlite bands so that the effect is not nearly so noticeable. The same considerations apply to dirt stringers, sulphide stringers, interdendritic segregations or other highly localized non-uniformities affecting differences in resistance to shear. Hence the value of microscopic and macroscopic examinations.

Such segregations can also operate on a gross-scale. Consider as an example a sheet made by the rimming process, straight away rolled so that the edges of the sheet represent 100 per cent ingot skin and the center of the width of the sheet represents, except for its surfaces, the segregated interior of the ingot. In extreme cases examinations will show:

	Skin	Core
Grain Size	6/8	Nonuniform very fine
Spheroidite	Small amount well scattered	Large amount in bands
Nonmetallics	Low	High
Deep Etch	Good	Poor
Sulphur	Low	High
Hardness	Low	High

	Skin	Core
Olsens	good	poor
Elongation	good	poor
Yield Strength	low	high
Tensile Strength	low	high

In certain cases the flow of the metal may be so inhibited that most of the deformation may be thrown into the softer parts of the sheet which fails there, not because of any lack of ductility there but because of the resultant localized deformation.

The various measurements cited above are useful in regard to mechanical properties, in that they indicate lack of uniformity and not that they do or do not predict results of deep drawing per se. Indeed a metal of higher hardness and lower ductility may perform much better if uniform. Surface imperfections which reduce the strength locally will cause failure in many cases, which can easily be visualized by again considering the drawn shell mentioned before. Here the strength of the cup wall is a ruling variable, surface imperfections reducing the maximum size blank that can be drawn.

The number of conditions which lead to local differences in resistance to shear are extremely numerous. It would not be profitable to mention them all. An unusual one was recently pointed out to the writer by Mr. Joseph Winlock and his staff, in certain types of austenitic stainless steels which involved a phase change at the point of maximum uniform elongation. This phase change hardened the metal greatly because of martensite formation causing deformation to cease at that zone and to proceed with increased vigor at some other location until the phase change occurred again.

One-Piece Lock Nuts Reduce Production Costs

Reduced production costs reportedly have enabled Stover Lock Nut & Machinery Corp. of Easton, Pa. to make lock nuts available at a lower price. The cost saving process results from special machinery designed by the manufacturer.

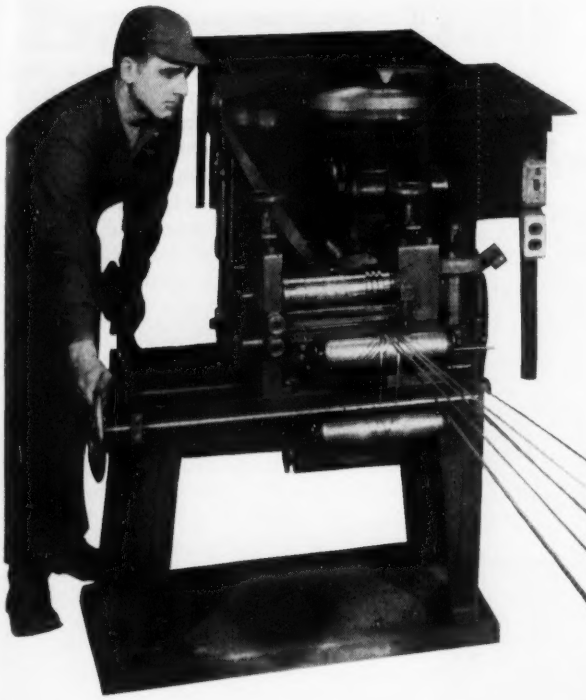
Nut uniformity is assured by Stoverizing, a precision process which is said to hold the same tolerances throughout a long run. Nuts are turned out as one-piece unit, but have the same dimensions and length as a standard nut. They are vibration-tested for safety, the grip being unaffected by prolonged vibration, extreme temperature variations or lubricants. The elliptical top design, which provides a heavy spring action on two opposite sides of the bolt and produces friction tension on the threads of the mating part, is said to make it impossible to shake the nut loose.

Millionth of an Inch Adjustment Possible

Rapid adjustments in terms of millionths of an inch may be made by fingertip control on a new 12-ton precision jig borer installed in the plant of Baker Brothers Inc., Toledo. One of two machines of its kind in this country, it is so delicately balanced that the 1-ton table on which the parts are rolled beneath the boring head could be pushed with the pressure of one finger, if it were disconnected from the rest of the machine.

Measuring scales placed above and below the boring head allow the operator to line up the parts to be drilled with extreme accuracy. A series of lenses and prisms magnify and illuminate the delicate graduations of the scale. Use of the machine reportedly will allow the company to drill the most accurate parts in this country.

Before installation was made six windows of the Baker plant were bricked up to keep out rays of sun which might affect the accuracy of the machine. It will be enclosed in an air-conditioned room for protection from dust and temperature variations as well as protection from sunlight.



HOW TO PUT MORE STEEL ON YOUR REEL

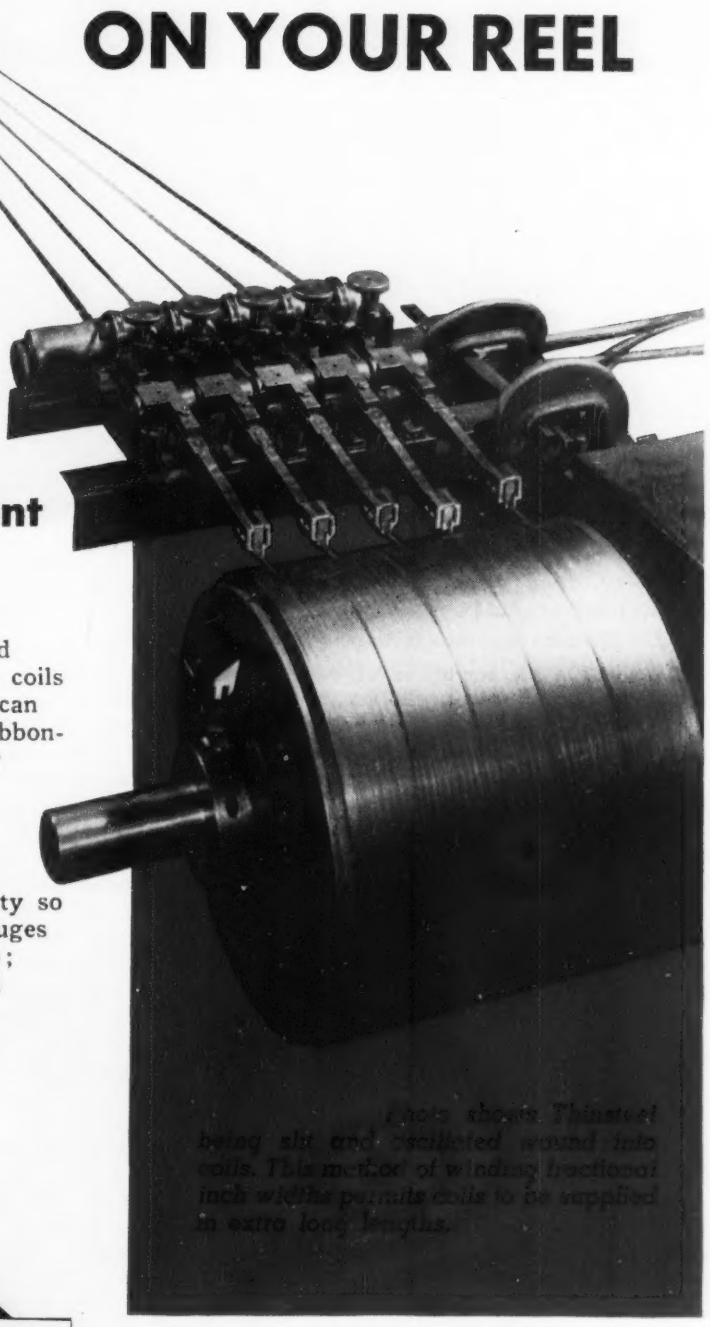


Photo shows Thinsteel being slit and oscillated wound into coils. This method of winding fractional inch widths permits coils to be supplied in extra long lengths.

more convenience plus less "downtime" of equipment

One way CMP Thinsteel can help you keep automatic reel-fed equipment at maximum production is by specifying fractional inch widths in oscillated wound coils. By using the longer and heavier coils possible with this method of winding, you can eliminate the problems that conventional ribbon-wound coils present—materially cut costly "downtime" and do away with the hazardous coil handling condition caused by extremely narrow widths.

Thinsteel can provide other cost reducing advantages, too—the usual precision quality so well known; extremely close tolerances; gauges thin as .001" in low carbon (zinc-coat, too); spring steel, alloy and stainless grades; and CMP's helpful assistance in problems concerning your strip steel requirements. Your inquiry will be given interested and immediate attention.

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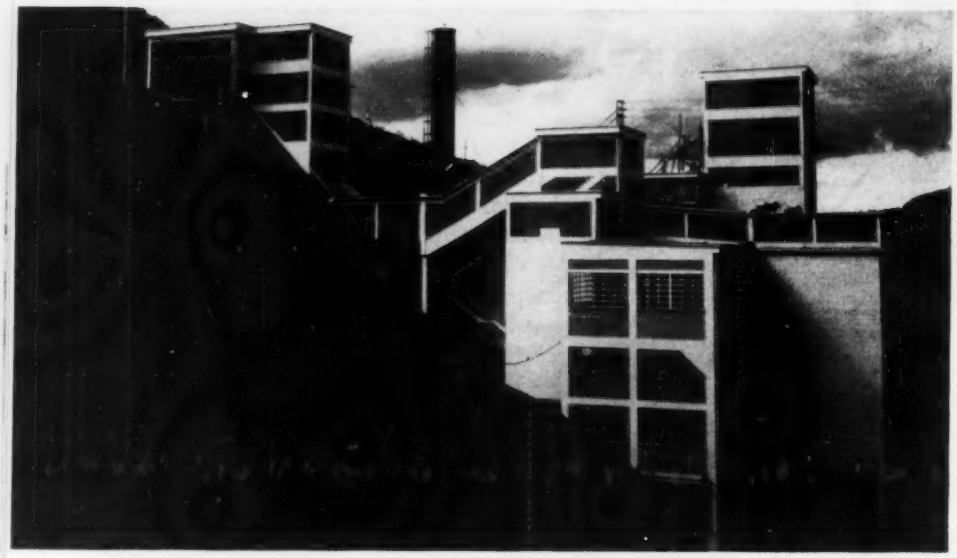
New Brazilian Sintering Plant

. . . utilizes waste charcoal as fuel



Iron ore sintering plant recently placed in production at Cia. Siderurgica Belgo-Mineira, Monlevade, Minas Gerais, Brazil

BELGO-MINEIRA, one of the largest and oldest steel producers in Brazil, with the purpose of increasing its blast-furnace production, decided in 1946 to beneficiate their rich iron ore deposits.

The project designed by John E. Greenawalt, New York, incorporated a complete crushing and screening plant, and a sintering plant for fines. Construction was started in 1947 and operations began in June, 1948.

Iron ore is mined from the company's rich Andrade mine, which is approximately 6 miles from the plant. It is brought in on their diesel-powered railroad, discharged into the main ore hopper and then crushed down to 1-inch size. All fines below ½-inch are screened out and stored in the plant's large concrete storage bins.

The deposit is formed of iron ores which are being mined at ground level. It is a high grade ore ((above 60 per cent Fe) and consists of 40 per cent lumps and 60 per cent fines. Utilization of the latter was definitely one of the reasons for the steel producer to install the sintering plant.

Prior to installation of the complete project, with its crushing and screening section, ore was mined, broken up by hand and shipped to the furnaces. It is now handled by a large diesel-powered shovel, brought to the sintering plant and there crushed and screened. Saving in this item alone is considerable.

The crushing plant consists of an Allis-Chalmers scalping screen, Blake crusher, and one double deck final sizing screen together with the necessary conveyors. Capacity is approximately 100 tons per hour.

Sintering is accomplished by the Greenawalt process. The building provides for two 150 square foot pans, one of which has been installed to date.

The method of sintering as practiced in this modern plant is unique. The pan has a depth of 14 inches. Each charge consists of three layers. A bedding layer, main charge and ignition layer. The bedding layer contains no fuel and is approximately 2½ inches thick. The main charge contains about 6 per cent fuel and is 10 inches thick. The ignition or top layer is 1½ inches thick and contains 12 per cent fuel. Each charge is thoroughly ignited in about 12 seconds. Sintering is even throughout the charge and few dead spots or blow holes are encountered.

The fuel used for sintering is waste charcoal from the company's four charcoal blast furnaces which is brought to the sintering plant by means of cars, discharged into a separate receiving hopper, and then crushed down to uniformity for use in the mix. The processed charcoal is taken by belt-conveyors to one of the large bins for storage. Sawdust is added to the mix for increased porosity.

Oil is used for ignition and consumption is slightly higher than ½-gallon per ton of finished sinter. The high suction provided for sintering is produced through two Greenawalt sintering fans operating in series, each directly connected to a 200 hp—1450 rpm motor.

The sinter is air cooled and thoroughly screened. All screened sinter above ¼-inch is taken directly to the blast furnaces. The sinter produced is especially low in silica, soft, not too fragile, and an excellent product for use in the company's charcoal blast furnaces.

Latest results on use of sinter in the blast furnace are most favorable, and show approximately 20 to 30 per cent increase in production, with a corresponding saving in fuel, depending on the percentage of sinter contained in the burden.

The plant is operating continuously, 24 hours a day—six days a week and the estimated daily production of 300 tons has always been attained and, even, sometimes exceeded.

The crushing and screening plant, sinter plant and storage bin are all constructed of concrete. The enclosure is of a novel construction peculiar to Brazil, consisting of checkered brick walls. This type of enclosure permits ample ventilation and light, while keeping out the rain.

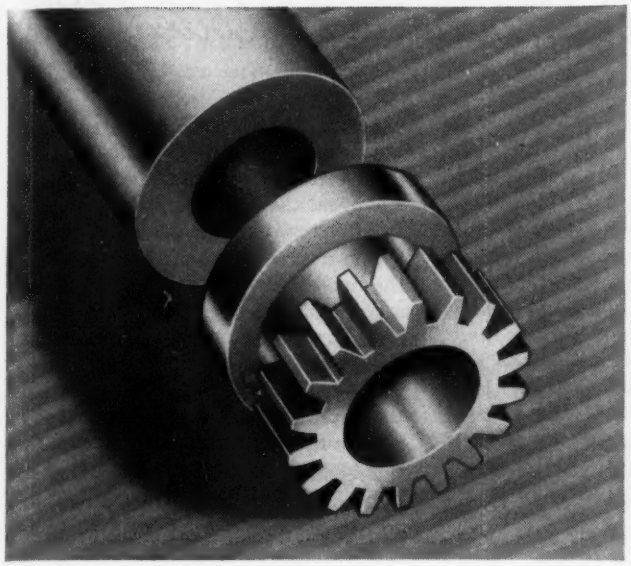
There are six large concrete bins for the storage of the ore fines, charcoal, sawdust, limestone and roll scale each having a capacity of 250 cubic meters. The feed from each bin is handled by a Greenawalt precision feed-table feeder.

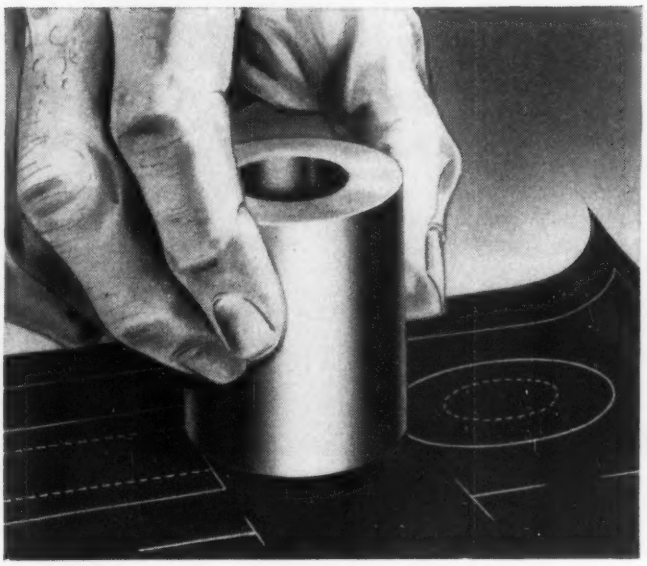
The plant has a central control room for all electrical controls and a modern machine shop and large storage room for spare parts are provided. Fans are located in a separate fan room, adjacent to the storage bins.

—o—

Solid carbide cylinders in a line of 115 sizes are being offered in both ground and unground form by Carboloy Co. Inc., Detroit. Among the wear-resistant uses of the cylinders are burnisher rolls, knurl roll pins, locating devices and plunger ends.

Two ways TIMKEN® seamless tubing cuts costs on hollow parts





1. No hole to bore

The first step in production is already finished when you use Timken® seamless tubing instead of bar stock for making hollow or ring-shaped parts. There's no hole to bore, less waste stock to pay for. Elimination of drills on automatic machines often leaves space for other tools, sometimes speeding production as much as 200 per cent!

Timken seamless tubing offers you a range of sizes up to 10½" O. D., covering a wide variety of requirements. Rigid control throughout every step in manufacture results in steels of fine forged quality and refined grain structure, with uniform machinability and heat-treating. This means a better product for you, with fewer rejects and increased customer satisfaction.

2. TIMKEN® tube engineering service gives you the most economical tube size—guaranteed to clean up.

When you make use of Timken tube engineering service, you can be sure of minimum machining time—maximum saving of metal. That's because the Timken tube engineering service takes full responsibility for giving you the most economical tubing for your particular job—and guarantees that it will clean up to your dimensions. We take all the risk!

This guaranteed service is made possible by the outstanding uniformity of Timken tubing and by the largest assortment of roll sizes of any mechanical tubing mill in the country. Get details of this service now—without cost or obligation. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

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Fine Alloy

STEEL

and Seamless Tubes

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing

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Plant-Devised Attachments

Speed Handling of Coiled Wire

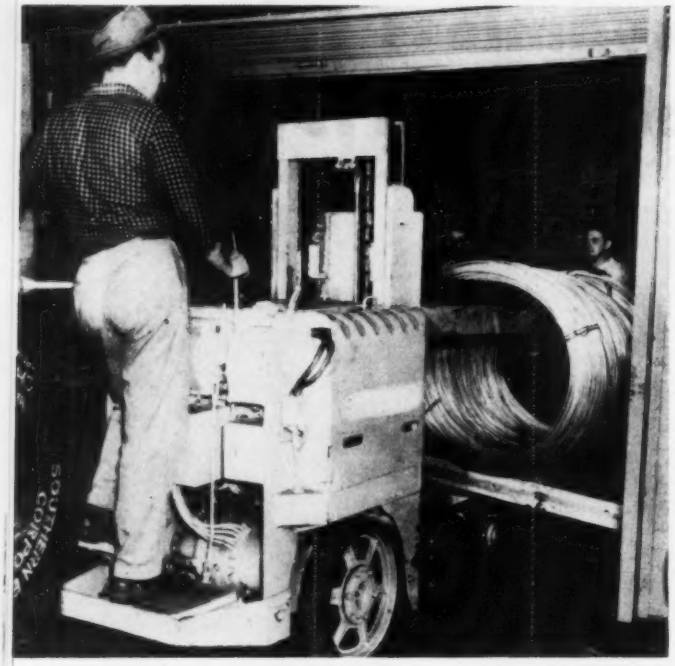


Fig. 1 — Unloading team is shown here placing coils of wire onto plant-devised "finger" attachment of industrial truck. Device reduces time of unloading an 80,000-pound car load of wire and placing product in storage from 2½ hours to 45 minutes

SEARCH for a better method of utilizing its fleet of four 6000-pound storage battery powered highlight platform trucks for moving coil and spools of copper, aluminum or steel wire and cable led to the development of two devices to speed up the work in the plant of Southern Electrical Corp., Chattanooga, Tenn.

One of these was designed by plant engineers to handle wire coils, the other to move wire wound on large spools or reels, both being constructed to fit the platforms of the trucks on hand. The attachments do not in any way interfere with the use of the trucks for conventional use. They can be attached or removed from the trucks in a matter of seconds through formed steel pieces welded to the back plates of the individual truck's platform.

Attachment used for handling wire in coils, Fig. 1, consists of a 10-foot railroad T-rail, one end of which includes a welded projecting lug. Latter fits into a clamp or socket welded onto the back plate of the truck platform. The rail is covered with a rubber casing to protect coils from unnecessary abrasion. When coils of wire are unloaded from railroad cars, the truck is moved up to the car door and the platform raised about 2½ feet. Each of the coils weighing from 250 to 265 pounds is placed on the projecting rail manually. About 20 coils can be transported in one load. At the storage area, the coils are simply lowered to the floor and the rail withdrawn.

The device, it is estimated, reduces the unloading operation to approximately 45 minutes, or a total of 3 man-hours taking into consideration the four men needed for the task. Previously, the coils were placed on truck platform manually, then moved to storage and manually unloaded.

Second attachment consisting of two small I-beams welded at one end to form a vee, is used in handling reels of wire. It also includes a projecting lug similar to the one used on the T-rail.

This fits into a socket welded to the back plate of the truck's platform. In addition, seats for holding a mandrel are welded at each end of the long legs of the vee. Body of the attachment rests on the platform as shown in Fig. 2, the parallel legs extending horizontally beyond the end of the platform.

To pick up a reel, a mandrel is first run through the center section of the spool. Then the truck is moved up to the spool with the platform lowered until the seats are under the rod. As the platform of the truck is raised, the reel also is raised into carrying position. The reels thus can be either moved to a storage area or, in case of smaller spools, taken directly to the end of the stranding machines.

In loading operations, involving services of four men including the truck operator, the attachment reduces the work of filling a highway truck with a capacity load of 15 reels to less than 30 minutes. Previously, the same number of men were required to devote about 1½ hours to the task.

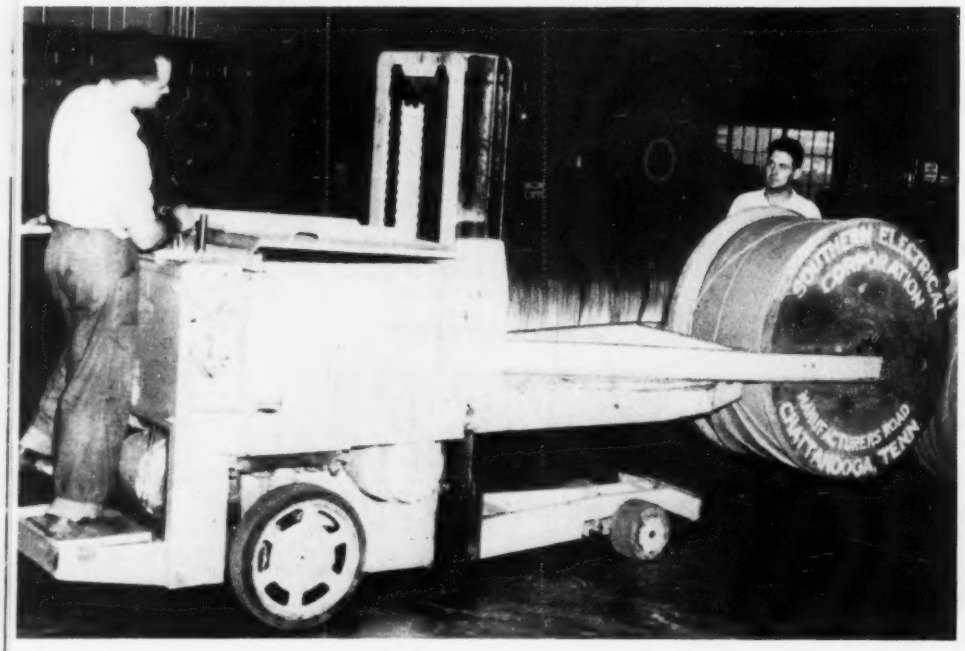
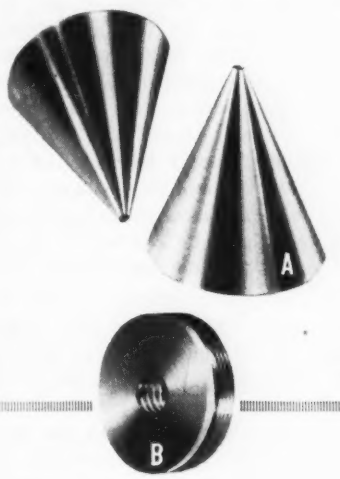


Fig. 2—Use of this V-shaped attachment facilitates handling of reels both in storage and positioning spools at stranding machines. Photos courtesy Electric Industrial Truck Association

HIGH DENSITY ALLOY

. . . with strength and machinability developed from tungsten-nickel-copper combination

By G. H. DENNY
P. R. Mallory & Co. Inc.
Indianapolis



Products made from new high density alloy. (A) Cones of this type play an important part in locating underground oil reserves. (B) The metal can be tapped and threaded

SEVERAL years before the beginning of the recent war, metallurgists at P. R. Mallory & Co. Inc., started development work on tungsten-nickel-copper compositions with a view towards developing a high density machinable material. Need for such a metal or alloy has been apparent for many years. Designers have worked with tungsten, gold, platinum and lead, but all have obvious disadvantages.

Tungsten is extremely difficult to form or machine and there are several limits on available shapes and sizes. Lead lacks strength and its density is only about 25 per cent greater than that of brass. Gold and platinum are too costly for most jobs.

While the initial results were not good, the material showed enough promise that the company set up a research and development project. Work continued for 2 years. Hundreds of powder mixes were tried, including experiments with silver, moybdenum, gold, platinum, iron and other elements. In the end, it was determined that best results were obtained with a proportion of tungsten-copper-nickel quite close to that used in making the original sample. However, improvements in processing the raw materials and in methods of pressing and sintering resulted in greatly improved properties and uniformity.

Density of 16.4 grams per cubic centimeter was assured and a hot forging operation made it possible to attain an average of 16.8 grams per cubic centimeter with a minimum of 16.6 grams per cubic centimeter. Tensile strength was improved from 40,000 or 50,000 psi up to 60,000 or 70,000. Machinability was better, but still left much to be desired. The material had little or no elongation and was "notch-sensitive."

Research to Production—Step from research to production brought the usual headaches, but by the end of the war, the company had supplied nearly half a million of one type of rotor alone. This was the first important commercial application of the metal.

Early in 1948 engineers working on a government contract asked the company for a dense gyro rotor material to operate at speeds beyond the safe limits for the strongest material then available. In less than three months the improved alloy, Mallory 1000 had passed the test.

Greater strength is one of the advantages of the new alloy. Machinability is so much improved that watchmakers find it possible to drill and tap it with the tiny tools of their trade. Weights or pendulums that automatically wind the springs of self-winding watches will be reduced by use of the new metal. This will mean reduction in size of the case and a more positive winding action.

These are not the only improvements in the new material. Hardness is lower (Rockwell C-24 to 30), modulus of elasticity is now rated at about 50 million psi, and ductility, as measured by elongation, is improved. The improved metal is far less "notch sensitive." Though preparation of raw materials is somewhat more expensive by the new method, processing has been improved and simplified to the point where overall costs are less, even for the parts "as sintered."

Powder Metal Technique — The alloy is made by powder metal technique. Powders are carefully mixed under conditions of controlled humidity, then pressed and finally sintered in a reducing atmosphere. Quality is carefully checked at each step of the processing. Final tests are for hardness, density and strength. Hardness range is important as an indication of ductility.

Tungsten provides weight, and copper and nickel form a Monel-like alloy that is a sort of matrix for the tungsten grains. In addition, there is some alloying between the three constituents.

Density of the metal is specified as 16.8 grams per cubic centimeter minimum. This figure can be obtained even in the case of pieces weighing 10 pounds or more. In smaller parts, a density of 17.1 grams per cubic centimeter is attainable. Maximum theoretical density is 17.286 grams per cubic centimeter. Material with a density of up to 19 grams per cubic centimeter can be made by reducing the proportion of alloying elements, but only at the sacrifice of other desirable properties, particularly that of machinability. On the other hand, some increase in proportion of alloying elements will give a material with higher ductility and even better machinability than the standard grade but at the sacrifice of density.

At this time size of parts is limited by pressing and furnace equipment. Pieces weighing 50 pounds can be supplied in some shapes; with special equipment this limit could be greatly increased. Tools and dies are available for the production of a great variety of simple shapes, such as rods and bars (limited to about 7 inches in length), disks, slugs and rings.

Applications—Applications fall into two main categories. Gyro rotors and watch weights are examples of uses where all possible weight is desired in a limited space. Similar applications are counterweights, vibration dampers in shafts and tool quills, balancing spheres in circular raceways and floats in flowmeters.

This alloy can also be used to advantage as a shield or filter for radioactive substances, or as a container for such materials. The value of any material as a shield or filter for gamma rays is a function of its density. The alloy is practically nonmagnetic and is highly resistant to most corrosive influences. This last property makes it valuable as fixtures and contacting members in plating and electrolytic deburring operations.

In machining the alloy, nature of the operation and type of chip are

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quite similar to those encountered in gray iron. Carbide tools are recommended, having a round lead point with a 7-degree clearance and 0-degree to 5-degree rake. Turning and boring operations are performed without lubricant.

In turning and boring for an average or medium finish, the material is turned at 240 surface feet per minute, feeding at 0.008-inch per revolution. A tungsten carbide cutting tool is used for this operation and the depth of cut may range from 0.002 to as high as 0.020-inch. For a fine machined finish, the material is turned at 300 surface feet per minute, feeding at 0.0045-inch per revolution with a depth of cut of 0.005-inch maximum. Most satisfactory results are obtained using a depth of cut of 0.002-inch.

In the usual production sequence to obtain speed and a fine finish, the average or medium finish is produced in the first operation, and the fine finish accomplished in the second operation. In drilling operations, a maximum speed of 1350 rpm is used for holes up to and including ¼-inch diameter. If the hole diameter increases up to ½-inch the speed is reduced to approximately 900 rpm. Beyond this point boring is used. In the drilling operation, standard paraffin oil is used. With this lubrication, approximately 15 to 20 holes are possible with one standard drill. Tapping may be done either by hand or by machine using a good grade of cutting oil. Class 3 threads are obtainable with carbide taps or by grinding.

British Discuss Forging Equipment at Meeting

Problems and developments of heavy forging plants and equipment were discussed at a recent meeting of the iron and steel engineers group of the British Iron and Steel Institute. Presented by J. A. Sanderson and J. G. Frith of Davy & United Engineering Co. Ltd. was a paper, "A Review of the Application and Design of Heavy Forging Presses" which covered presses ranging from 5000 to 10,000 tons capacity. It included a table listing all of the presses within that range existing in the world today.

"A Modern Heavy Forging Plant" was the paper presented by W. H. Alvey, chief engineer, English Steel Corp. In it he reviewed the operation and performance of six forging presses of English manufacture, five of which were over 30 years old. It was pointed out that the five older presses still give good service and in many cases, are producing a greater annual tonnage of forgings. Production increases were realized with a considerable number of improvements in operating efficiency, including addition of new equipment.

Detailed reviews of the various types of manipulators used for forging presses of different sizes were given in the paper, "Heavy Forging Manipulators", presented by A. V. Flinn, of Adamson-Alliance Co. Ltd., London. Construction and operation of various systems of manipulators and a number of layouts of a forging plant showing the possible positions of the press, the furnaces and the manipulators were covered. Stressed was the importance of a complete and detailed study of the conditions of the plant and of the work to be performed before deciding on the best type of manipulator to be used.

Standard Papers Offered

A series of papers on the subject "What Good Are Standards?" is being published in a single pamphlet by American Standards Association, New York. The papers, presented at the 1948 annual meeting of the association, include discussions of such important problems as the legality of standardization, standardization work of the Munitions Board and functions of standardization in such company operations as purchasing, manufacturing and marketing. Importance of standardization is taken up by authorities in their respective fields.

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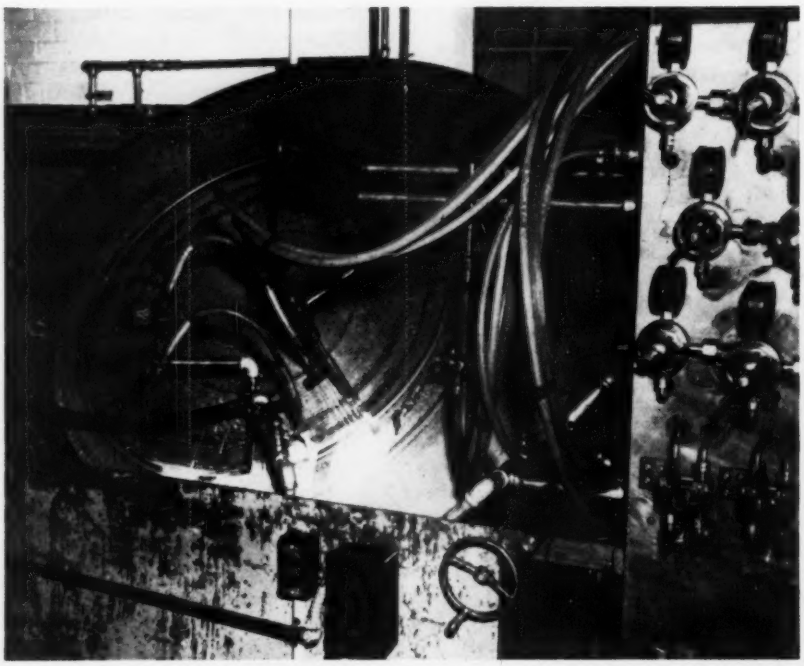
Instantaneous electronic mercury vapor detectors are now owned and operated by 16 state governments, according to General Electric Co., Schenectady, N. Y. The instruments are designed to measure concentrations of mercury vapor in air which may be injurious to the health of workers.



MOLD LIFE INCREASED: With steel molds used in the manufacture of mechanical packing made of rubber composition wearing out so fast as to markedly increase the cost of production, the Garlock Packing Co., Palmyra, N. Y., called in Morley Machinery Co. of Rochester. The latter company thought the problem could be solved by use of the oxyacetylene flame hardening process. Working with Air Reduction Sales Co., New York, they devised a special flame hardening set-up. Two revolving adjustable speed tables were used to accommodate symmetrical and circular steel surfaces up to 24 and 64 inches in diameter on which were mounted Airco flame hardening torches and tips. Depth of hardening was controlled to about 1/16-inch on lips and faces of each set of molds. Along with wearability, packing quality has improved

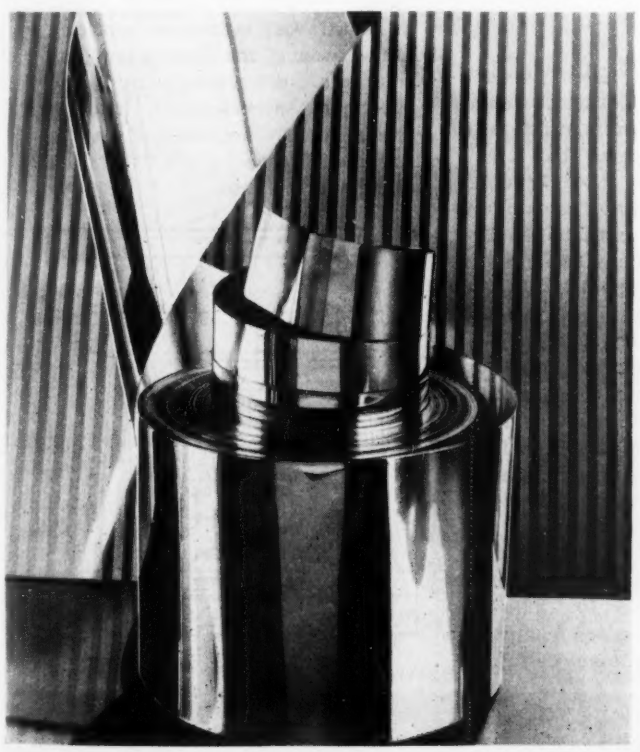
NICKELOID ZINC BASE METALS BEING UTILIZED TO REAL ADVANTAGE

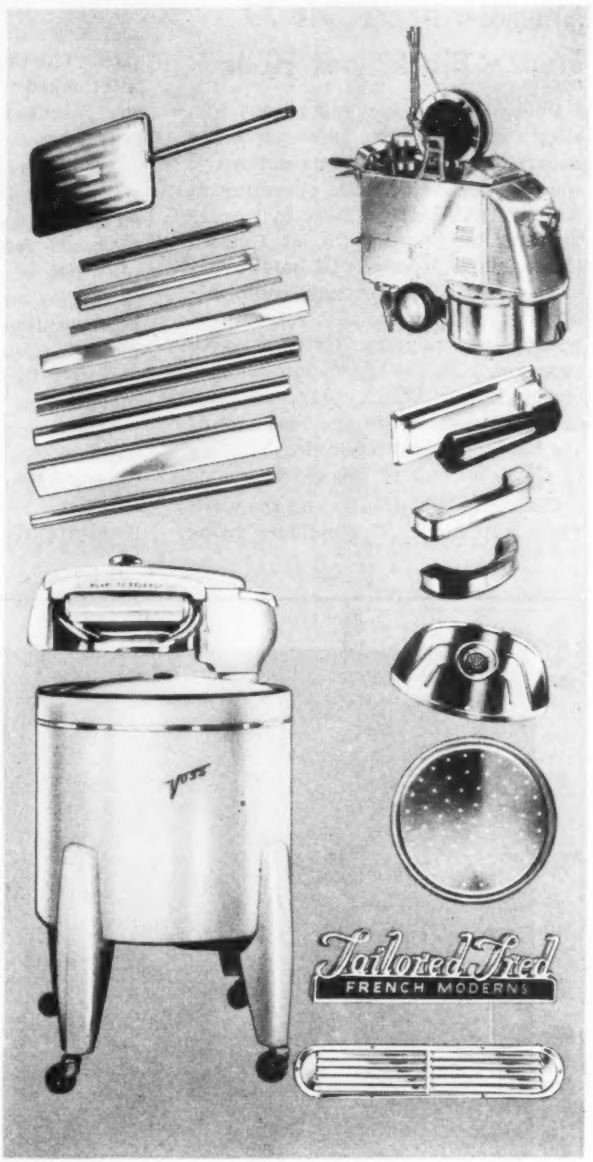
In the choice of base metal for pre-plated parts on consumer products, the manufacturer many times has a tendency to overlook the many advantages of zinc. In purchasing his plated sheets or coils he may first think of steel or aluminum base — or brass and copper.

In cost, zinc base plated sheets or coils occupy a position rather midway between plated steel and, for example, plated copper. Plated zinc is easily worked and thus is adaptable to blanking, forming, stamping and other fabrication methods.

Durability of pre-plated zinc is high. As a base metal it is rust-proof and highly corrosion resistant. With zinc as a base metal for platings, the raw edges or unplated metal back is no objection. The finish is beautiful, mirrorlike, and plated zinc is available in a range of gauges and tempers.

Zinc as a base metal may be procured with finishes of either nickel, chromium, copper or brass. It is available in sheets or long continuous coils, plated one or two sides, bright or satin finish. It is also available in crimps and patterns for unusual effects.





Just a few of the hundreds of items manufactured in quantities which employ pre-plated zinc base Nickeloid Metals.

While many metals are short in supply or delivered on an allocation basis thus necessitating anticipation of requirements, sheet or coil zinc is a little easier in supply. Our Peru, Illinois, plant, in addition, is located in the heart of the zinc rolling area where time is saved in delivery. In view of the workability and durable qualties of zinc base metal — it is one of the pre-finished Nickeloid Metals now receiving more than ordinary consideration on the part of manufacturers.

We have just completed a new folder on our pre-plated zinc base metals with finishes of nickel, chromium, copper or brass. Write for it on your company stationery.

AMERICAN NICKELOID CO.

Peru 1, Illinois

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Machine Processes 77 Engine Blocks per Hour

Seventy-seven 6-cylinder cast iron alloy engine blocks are processed hourly on a new three-way automatic special-purpose machine operating at 80 per cent capacity. Built by Snyder Tool & Engineering Co. of Detroit, the machine processes 32 holes every 45 seconds. The process comprises counterboring six exhaust valve insert holes, taper reaming six inlet valve passages from the top, countersinking one hole for Welch plug, countersinking two holes in the rear end of the block and countersinking 17 holes in the front end of the block.

Clamping is hydraulic and the work cycle automatic. The cylinder block is loaded onto an elevator platform and lowered down over solid locating pins. The automatic work cycle is interlocked with the hydraulic clamping mechanism and can be started only when clamping is completed.

High speed steel tools are used throughout at speeds ranging from 60 to 90 surface feet per minute. Tool feeds are variable, permitting the application of the machine to blocks of varying composition. Left and right horizontal heads have 5 and 7½-hp motors, respectively. Vertical head is powered by a 15 hp motor and is mounted on a slide unit.

Wishbone type column of the machine allows space directly behind the block for the addition of another unit from the rear, if desired for future applications. The design also allows for easy chip removal. Base is of welded steel construction, ribbed and normalized for rigidity. A floor space of 80 x 150 inches, including the loading shelf in the conveyor line, is required for installation.

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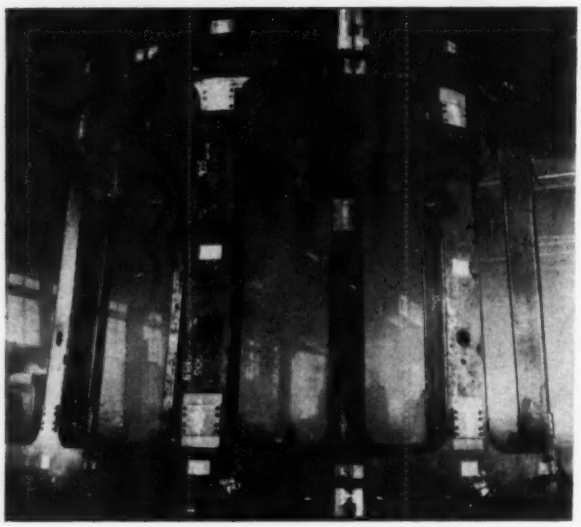
Job-to-job hauling of tractors, concrete mixers, compressors and other types of bulky loads is speeded up with an 8 to 10-ton tilting trailer developed by La Crosse Trailer Corp., La Crosse, Wis. Models with 96 x 187-inch and 78¼ x 124½-inch platforms are made. Trailers can be used with stakes or box sides for hauling bulk materials. Use may be behind any standard ½ to 1 ton truck equipped with standard pintle hook.

Designs Earthquake-Proof

BLAST FURNACE MANTEL SUPPORT



View of mantel support as erected in shop

HOW to construct a blast furnace to withstand seismic forces was one of the most important design problems connected with the plant of the Compania de Acero del Pacifico now under construction at the Bay of Vincente, 5 miles from Concepcion, Chile. The plant site is in a location subject to severe earthquakes.

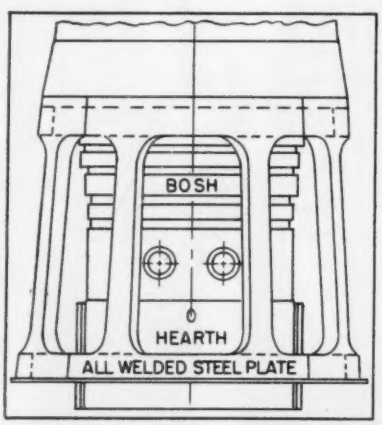
After considerable study of this problem F. E. Kling, chief engineer, H. A. Brassert & Co., New York, designed the all-weld mantel support. A view of the unit assembled on the shop floor of the William B. Pollock Co., Youngstown, O., is shown in the accompanying illustration.

This design is a radical departure from the usual American practice. The base, columns and mantel are made up of rectangular, hollow box-girder sections fabricated by welding from 1¼-inch steel plates. The design is calculated to give maximum stiffness to the whole structure so that it will adequately resist the bending, twisting and buckling forces likely to accompany an earthquake. The junctions of the base and mantel with the columns are flared out so as to transmit forces between adjoining parts without any excessive local concentration of stresses. The base, columns and mantel after being welded together form a rigid monolythic structure.

In addition to being earthquake-proof, the new design is considerably cheaper to fabricate and erect, containing less than half as much steel. For the 680 metric ton furnace designed for Chile the weight of the furnace compares with one of conventional design as follows:

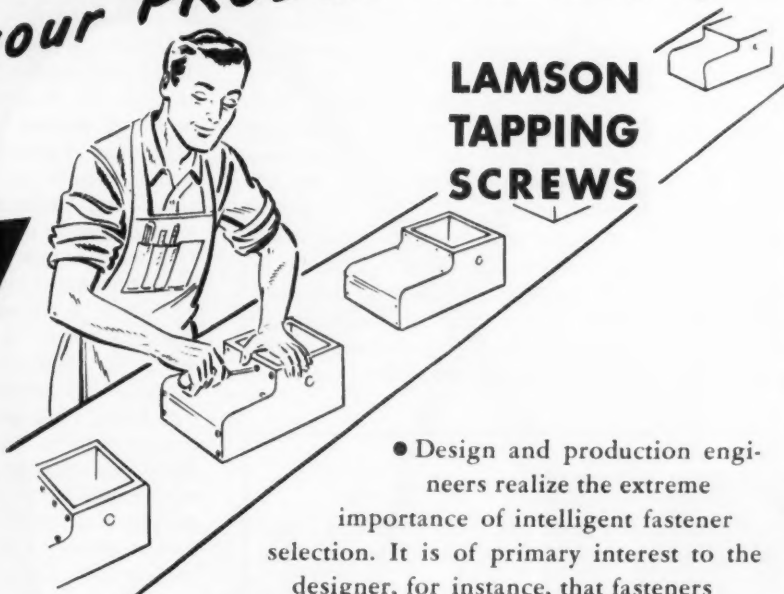
Furnace design	Weight, lbs
Conventional	528,000
New	242,000
Total saving	286,000

For a 12-tuyere, 20-foot hearth furnace, the conventional design calls for 12 columns while the new welded box girder design permits the use of only eight spaced alternately 40 and 50 degrees apart. This affords increased working space around the hearth and results in a much more desirable and practicable arrangement, since it eliminates the necessity of having tuyeres directly above the iron and cinder notches.



Mantel support in relation to hearth and bosh

The right HEAD— The right THREAD for your PRODUCTION LINE!



LAMSON TAPPING SCREWS

FOR THE SPECIFYING ENGINEER

HEADS

THREADS

Type "A" thread is pointed for quick, clean starts in small drilled, clean-punched or pierced holes in lighter gauge metals.

"A"

"B"

Type "B" is the "dog" pointed type for use in heavier materials.

Type "C" thread is also available in the above heads.

● Design and production engineers realize the extreme importance of intelligent fastener selection. It is of primary interest to the designer, for instance, that fasteners have the holding power and durability to withstand strains and stresses imposed upon them. The production man insists upon quick-assembling fasteners with high torque strength. Fumbling and material waste cannot be tolerated.

Lamson & Sessions Tapping Screws offer a happy combination of these "musts"—plus a wide selection of heads with slots or recesses in carbon or stainless steels. All heads are available with "A", "B", or "C" type threads.

Make Lamson your headquarters for Tapping Screws, and be assured of trouble-free uniformity from a dependable source of supply.

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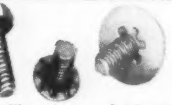
"One Dependable Source for All Fastener Needs"

SEMS	LOCK NUTS	NUTS	STUDS
STOVE BOLTS	LAG BOLTS	WASHERS	RIVETS
TAPPING SCREWS	ROPE CLIPS	SET SCREWS	PLOW BOLTS
"1035" CAP SCREWS	MACHINE BOLTS	CARRIAGE BOLTS	COTTER PINS

WANT MORE INFORMATION on any of these fasteners? CHECK—and CLIP this strip.

—CUT ALONG THIS LINE—

LAMSON LOCK NUTS: Economical, vibration-proof. Can be re-used repeatedly.



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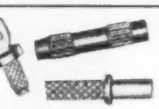

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NEED FOR WELDING ENGINEER

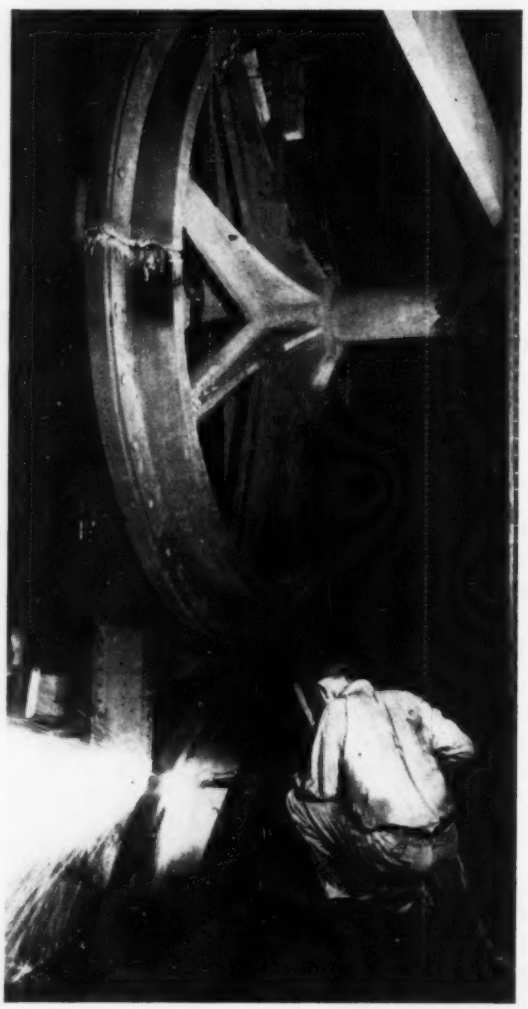
Emphasized at Tenth Annual Ohio Welding Conference

FUTURE of welding will depend, in very large measure, upon the research going on today, O. B. J. Fraser, director of technical service on mill products, International Nickel Co., New York, and first vice president of the American Welding Society, told individuals attending the tenth annual Ohio Welding Conference, at Ohio State University in Columbus, Apr. 7-8.

Speaking before members of the Cleveland, Cincinnati, Columbus, Dayton, Mahoning Valley and Toledo sections at a dinner meeting in the Ft. Hayes Hotel, following the first day's session of the conference sponsored by the university's department of welding engineering with the co-operation of the American Welding Society, he cited measures that must be taken by the industry to assure greatest welding progress.

"We must strive for higher quality, greater reliability, greater speed and lower costs", he said. "For these we must have adequate controls of men, metallurgy and machines, proper codes for good practice and continuous education of technicians and the general public."

Besides insuring that good welding is done, the industry should see that welding progress is not hampered by too rigid, or too expensive requirements for production, inspection and testing, he stated.



DIFFICULT TO SCRAP: These large cast iron wheels, 10 feet 6 inches in diameter and weighing about 5 tons each, had defied two previous attempts to scrap by cutting when J. L. Phillips, a Chicago contractor succeeded using powder cutting. Four cuts were made in each rim—about 13 inches—in about 12 minutes per cut. The hub was split and the spokes were cut at rim and hub. The blowpipe used was an Oxweld cutting blowpipe, equipped with a powder adaptor, furnished by Linde Air Products Co., New York

"There is a need for the welding engineer. It is not sufficient to mark 'weld' on the blue print and leave the engineering up to the welding operator", he said.

In addition to Ohio State University which, incidentally, is the only school conferring welding engineering degrees to its graduates thus far, 25 educational institutions are conducting fundamental welding research. Furthermore, important sums are being spent each year by manufacturers of welding equipment and supplies and by various fabricators, he pointed out.

Eleven papers were presented at the 2-day session. During the first day, C. B. Voldrich, chief welding engineer, Battelle Memorial Institute, Columbus, discussed the strength of welded joints in thick aluminum plate, and problems encountered in joining plates up to 6 inches thick. Following a talk on safety practices in oxyacetylene welding and cutting by James I. Banash, consulting engineer, Chicago, R. M. Dennis, manager of fabrication, By-Products Steel Co., Coatesville, Pa., pointed out some unusual production problems overcome by the use of machine gas cutting methods. Interesting reports were made by both A. F. Busick Jr., chief engineer, Marion Power Shovel Co., Marion, O., and Martin P. Korn, consulting engineer, Detroit. The former talked on the industrial use of modified armor plate steel and, the latter, on creative design with welded rigid frames.

Resistance welding was the main topic of discussion Friday morning. James F. Deffenbaugh, Federal Machine & Welder Co., Warren, O., pointed out advantages of resistance welding machines, and E. A. Mallett, sales engineer, Taylor-Winfield Corp., Warren, O., followed up with a discussion on the use of jigs and fixtures. William H. Kearns, assistant welding engineer, Lustron Corp., Columbus, described tooling involved in setting up resistance welding operations for fabricating steel homes. L. K. Stringham, engineer in charge of welding applications, Lincoln Electric Co., Cleveland, presented one of the three papers Friday afternoon dealing with welding codes.

Prof. R. S. Green, acting chairman of the University's department of welding, was chairman of the conference committee.

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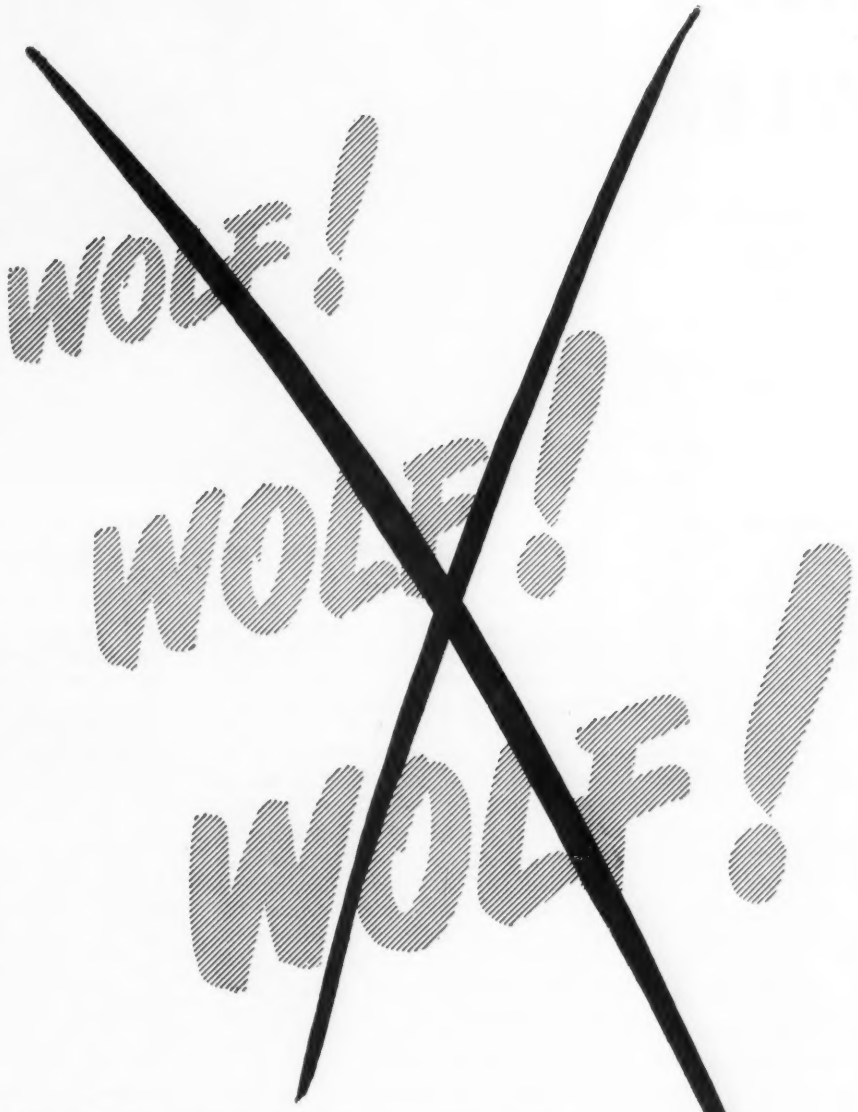
Nylon, vinyl and the complete range of thermo-plastic material may be molded in the 2-ounce, all-hydraulic Minijector plastic injection molding machine displayed by Moslo Machinery Co., Cleveland.



Unfrightened by dire predictions, leaders of American business always have planned with confidence in the future . . . and, in the long run, their faith has paid off. Such courageous leadership helps to *create* good business.

Good business means jobs for those who want to work. It's the best defense against the termites who are working to undermine the individual liberties Americans enjoy. 6593

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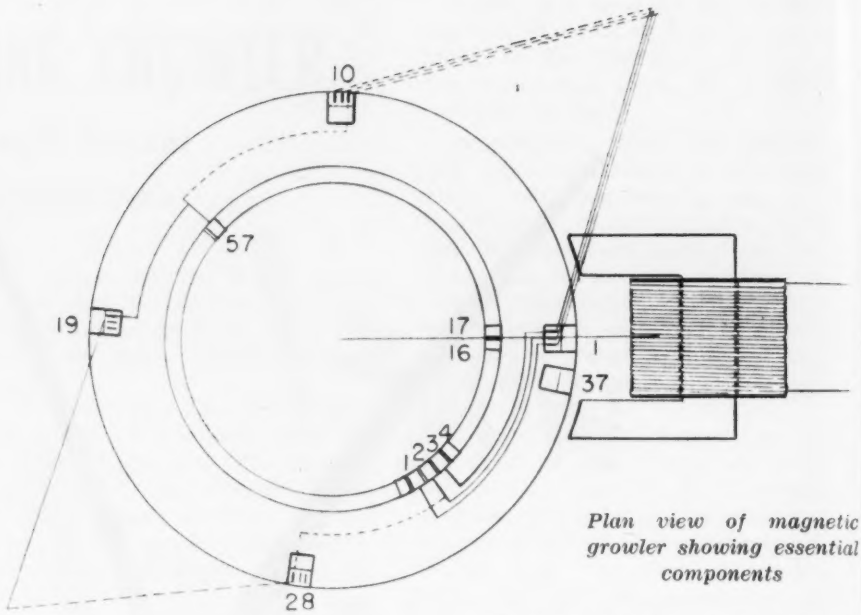
MAGNETIC GROWLER

. . . used to locate leads in finished armature



Plan view of magnetic growler showing essential components

LEADS in a finished armature can be located accurately without disconnecting any of the coil leads from the commutator by a method described before the New York winter meeting of the American Institute of Electrical Engineers by Roy Stott Jr., motor engineer, Westinghouse Electric Corp., Buffalo. Its method involves the use of a magnetic growler which consists of a U-shaped core of laminated steel punchings and an exciting coil which is wound around a section of this core. Physical size of the unit is made to accommodate the sizes of armatures which are to be checked, but this size is not critical the author stated.

Growler operates on the principle that an alternating flux, sent through a shorted armature coil, will set up a current in the coil. This current in the coil will set up a magnetic field of its own and a piece of steel will vibrate when held in this alternating magnetic field.

Use of an actual armature design is the best means of following the operations of the growler in locating the leads. The author chose for this purpose a design of 111 bars, 37 slots, 4-pole, 2-circuit progressive, coil throw 1-10, bar throw 1-57.

Armature to be tested is placed next to the growler as shown in the accompanying illustration, growler is energized and two adjacent commutator bars are shorted together, bars 1 and 2. A strip of steel is slid around the armature core until it vibrates over a slot 10. This slot is marked with a chalk mark and the steel strip is moved on around the core until it again vibrates over a slot (slot 19). This slot is also marked by chalk. The strip is slid around the armature and each slot that is indicated by the vibration is marked until the steel strip has passed completely around the core slots 1, 10, 19, 28. By this method, the slot throw has been determined.

To locate the leads from the commutator to the coil sides in slot 1, the steel strip is placed over the slot marked by chalk (slot 10), and the shorting strip is moved around the commutator shorting adjacent commutator bars until the metal strip over the slot vibrates. These bars, 3 and 4, are marked and the next adjacent bars, 3 and 2, are shorted to see if the strip still vibrates. If it does, the next procedure is to short the next adjacent bars, 2 and 1. This process is continued until no vibration occurs (in the case of this example, bars 1-111).

With the bar to the left of the shorting strip bar 1, the commutator bars are counted until the center of slot 1 is reached, this giving the side throw of the coil (center of mica between bar 16 and bar 17 is on the center line of slot in the illustration). The coil throw and side throw of the armature have thus been determined without the unnecessary expense and delay of lifting any coils from the commutator.

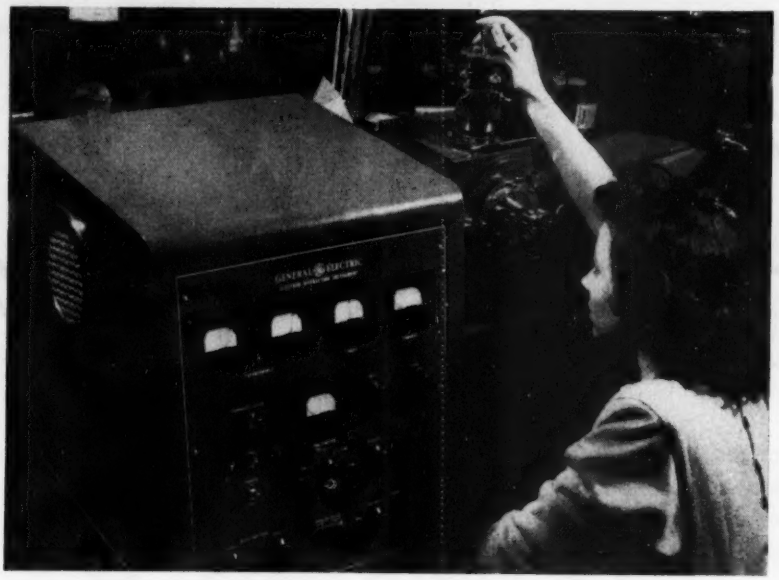
Truck Axle Machined On 42-Spindle Machine

Rear axle for use on a low clearance type delivery truck has the following operations performed on a special two way 42-spindle horizontal machine: Roughing and finishing bore large hole, facing end, drilling and reaming bolt holes from outside and spot facing bolt holes from inside. Built by LeMaire Tool & Mfg. Co. of Dearborn, Mich., the machine consists of a fabricated steel center base with two side bases each of which supports two twin-ram units. Center base carries a 3-station shuttle-type fixture and special rear drilling unit used in spotfacing holes from inside of axle ends.

A feature of this machine, made necessary by the camber of the axle of 1 degree from horizontal on each wheel mounting surface, was the necessity of angling all outside units down 1 degree and providing a center rear unit mounted on bars that would spotface at 1 degree up from horizontal feeding to the left, would tilt to 1 degree up from horizontal in the opposite direction and feed to the right. By means of an auxiliary hydraulic cylinder, a pilot for the boring tool is carried through the hole to be bored and enters a pilot bushing. The feed of the unit rough and finish bores the large hole, bringing into position a special cross facing tool. Continued feed causes single point tools to feed across the face. There are three of the tools performing rough, semifinish and finishing cuts. Production is said to be approximately 10 axles per hour.

—o—

Those concerned with the production and use of steel piping materials —pipe, castings, bolting, flanges, etc., —are provided with an up-to-date compilation of the specifications of concern in this field by the American Society for Testing Materials standards on steel piping materials. Prepared by the society's committee A-1 on steel, the standard is in its sixth edition. Copies of the 330-page book may be obtained from the society headquarters, 1916 Race St., Philadelphia, for $3.00.



Instrument Spurs Jet Engine

Metals and Lubricants Research

SEARCH by engineers of the National Advisory Committee for Aeronautics for better metals and lubricants for jet engines is being aided by a new instrument which uses a stream of electrons to study a layer of metal less than a 0.000025-inch thick. Developed by the general engineering and consulting laboratory of General Electric Co., Schenectady, N. Y., the electron diffraction instrument is used in determining the effects of various lubricants and in friction studies of polished metal engine parts.

As ordinary lubricants reportedly are not adaptable to high speeds and temperatures inherent in jet engine operation, new lubricants must be developed. With the instrument, engineers can detect in a short time natural films which emanate from the steel itself and chemical changes produced on the surfaces by lubricants. They say that these chemical changes are not visible under a microscope.

Finds Friction Causes — Researchers have been able to identify specific film materials normally deposited on the bearings when the engine operates by subjecting the metal parts to temperatures and speeds which simulate actual flight conditions, and then examining the parts with the instrument. As used to study parts which have been worn by tests, the device helps the engineers discover and minimize the causes of friction, GE states.

In actual operation, electrons are "boiled off" a white-hot tungsten filament and focused into a beam by a magnetic "lens." For one type of work, the beam is then pased through a two-millionths-inch-thick section of metal, producing an image on a fluorescent screen or on a piece of ordinary photographic film.

In other applications of the instrument which, according to the company, has been used to study corrosion, surface deposits, paint thickness, inks and dyes, the beam is directed to a metal surface at an angle. Tiny projections on the surface diffract the electrons and form the image.

Image produced is said to be different for each material and both the surface conditions and crystal arrangement of the molecules of metal can readily be determined. Since electrons will not pass through air freely, the chamber in which they travel is evacuated to a pressure of approximately one eight-millionth that of normal air pressure.

Machine Mounts Three Tapping Units

Three individual U. S. lead screw tapping units mounted horizontally and one such unit mounted vertically on a common, steel fabricated base, comprises a special tapping machine designed for a multiple number of holes on a cylinder housing. Built by Avey Drilling Machine Co., Cincinnati, it has an open position at the right front of the machine for the addition of another tapping unit in the future. Production is said to be about 70 to 80 complete units per hour.

Each spindle on the tapping unit incorporates a preset spring tension arrangement acting as a safety measure for preventing taps from being broken in case they run into a blind hole or in case the part was incorrectly positioned in the fixture. The operator inserts the part in the fixture and then a lever automatically actuates an air cylinder which raises the part into the proper position. A permanent phase rotation indicator is built into the pushbutton station, its purpose being to indicate proper motor rotation before starting the cycle of the machine.

Parts with Thin Wall Sections Easily Broached

Three round holes, each 1.432-1.442-inch in diameter and 10 13/16 inches long are broached in magnesium alloy die castings with no deformation of the castings, according to a manufacturer of servo units. The broach used in the forming of these servo units was designed by Colonial Broach Co. Inc. of Detroit, and is 72 inches long and has 29½ inches of teeth.

Broach teeth are in groups of six, followed by a guide dwell. Each sweep of the broach through the casting removes a total of 0.097-inch of stock. Although the wall sections adjacent to the two end holes in the castings are quite thin, broached holes are said to be straight and true with no casting deformation.

—o—

Operated by Vickers hydraulic equipment, the new ¾-ounce hydraulic Minijector plastics press, introduced by Moslo Machinery Co., Cleveland, has a built-in release valve for injection pressure control and a hydraulic indicating gage with manual shut-off. The hand-operated hopper is of the metering type.

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FUNDAMENTALS of STEELMAKING

NUMBER 6 OF SERIES

Another in a continuing series of articles on the making of steel and finishing it into products ready for the consumer. Each article is written by an outstanding authority in his particular field.

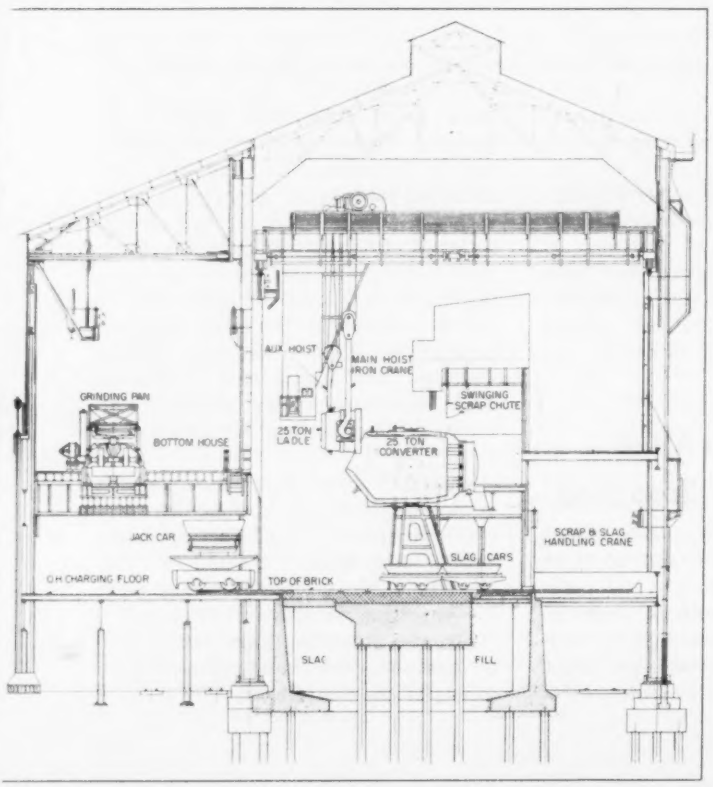
Production of Bessemer Steel

By H. W. GRAHAM
Vice President and Director of Technology
Assisted by
Robert E. Edwards and Wayne G. Laughlin
Jones & Laughlin Steel Corp.
Pittsburgh

Regarding larger bessemer units, the limit of converter capacity has not definitely been established but appears to be restricted only by economic considerations and extensive changes to supplementary facilities that would be required to service larger units

PART II

EARLY bessemer converter plants were designed to produce only one type of product, either ingots or castings, and capacity of converters was comparatively small ranging from about 3 to 15 tons. These two factors simplified plant layout and operation, compared to today's modern shop which may be producing simultaneously bessemer ingots and blown metal for use in a duplexing operation. Delivery of blown metal to only one point and the use of only one type of iron made possible production rates that compare favorably with plants of later design, even though individual converter capacity was not great. Plants of this type are still in operation. Converters are two in number, often positioned to rotate in the same plane, turning down towards each other so that charging of molten iron and other materials can be accomplished through a common spout or chute.



Hot metal mixers, scrap storage, and bins for miscellaneous materials are conveniently located on a level above the converter nose. Materials are conveyed to the converter area by buggies operated on tracks by draglines, and the charging spout or chute swung into place to deliver into the converter mouth. While blowing in one converter proceeds, the same equipment can be utilized for charging the other unit. Teeming or casting operations are synchronized likewise to the operation of the two converters with comparatively simple ladle and mold handling facilities required.

Later the trend was toward construction of plants using larger converters of 20 to 30-ton capacity. In European practice, converters of 50 to 60-ton capacity have been operated successfully, thus any large scale expansion of American facilities will probably include units of greater size. Limit of converter capacity has not definitely been established but appears to be restricted only by economic considerations and the extensive changes to supplementary facilities that would be required to service larger units. This increase in converter capacity, accompanied by the development of duplexing processes necessitated drastic changes in plant layout, and in the type and size of supplementary facilities such as hot metal mixers, cranes, and metal handling arrangements.

Location of the converter plant as a whole is established with consideration given to other interrelated units such as blast furnaces, open hearth furnaces if duplexing is involved, slag disposal dumps, ingot strippers, and rolling mills. Distances between these units are kept to an absolute minimum, for obvious reasons.

Present day converter plants contain two, three, or four units usually placed in a row and rotating in parallel planes. Charging platforms, craneways, rail-

Fig. 6—General section through bessemer converter building showing facilities for charging hot metal and scrap

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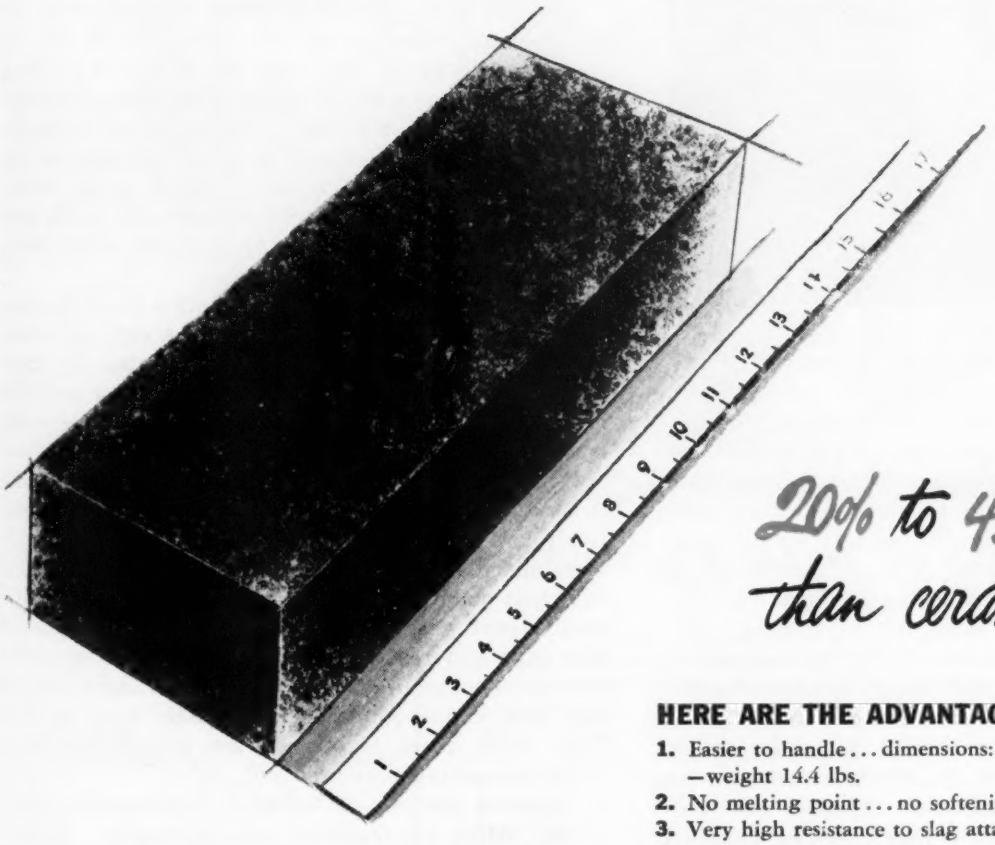

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Key brick 13½" x (6"-5") x 3"—weight 13.2 lbs.
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Fig. 7—End of blow. Molten metal being poured from bessemer converter into ladle

way systems to convey blown metal ladles and similar equipment are then extended in a direction perpendicular to the plane of converter rotation thus bearing the same relation to each operating unit. Hot metal mixers, depending in number on the varieties of blast furnace iron required, are located at one end of the shop, close enough to minimize the distance iron for charging must be transported. The spare converter stand for major repairs, such as relining, is placed in line with the opearting units but apart from the operation. The "bottom house" is located at some point in the rear of the converters, or opposite to the direction in which converters are turned down for charging and emptying, also separate from the mill proper. Plants may be classified in two general types, depending on method of charging used. If this operation is performed from an elevated charging platform extending in front of the converter, hot metal and scrap can be transported from loading positions at the ends of the shop to the converters by dragline operation. In this case, overhead crane systems are unnecessary, being limited to perhaps a single gantry type crane, since much of the work in the converter area proper can be performed by traveling jib cranes. This arrangement minimizes structural members in constructing the mill, permits the use of greater space for each unit op-

Bessemer Steel

erating, and is the safest, cleanest, and cheapest type to operate. The second type involves charging of hot metal and other materials by crane, transporting the hot metal ladles to the converter either directly from the mixer or hot metal buggies by crane. Scrap additions may be made from an additional elevated platform, erected above the converters and equipped with chutes. Mills of this type are necessarily more congested, and more difficult to operate for this reason. The operating pulpit is located at a central point that provides maximum vision of the entire mill area to operating personnel. Teeming platforms are located in front of the converters, close enough to minimize ladle handling, although in some cases an adjacent open hearth teeming pit may be utilized. Teeming ladles are transferred to the platform by hot metal transfer buggies or directly by crane. If duplexing is involved, provision is made for transferring hot metal ladles from the converting mill to the open hearth in such fashion that they can be emptied and returned without delay.

Quantity of the converter charge is determined by the operator, allowing for the normal yield loss in blowing (8 to 10 per cent) and the weight of product desired. In the case of ingot production, accurate weight measurements and fairly constant metallic losses are especially important, since amounts in excess over that required to fill the ingot molds available for a heat reduce the overall metallic yield, and insufficient amounts result in short ingots which may not be applicable as product.

A bessemer charge consists of molten blast furnace iron with varying amounts of steel scrap, pig iron, ore, scale, or other iron bearing materials. In some instances alloying elements such as copper or sulphur may be added to the converter before blowing commences.

Iron for use in the production of bessemer ingots is produced from the so-called "bessemer" comparatively low phosphorus content ores. These ores have been mined in the Great Lakes district ore fields in sufficient quantity to support the bessemer operation until recent years. A gradual depletion of ores of this type has resulted in the development of other low phosphorus ore fields. One major development has been in the Adirondack mountain area of New York state where high-grade low phosphorus magnetite concentrates are produced.

Chemical analysis of bessemer blowing iron is included within the following general ranges: Silicon, 1.00 to 1.60 per cent, phosphorus, 0.070 to 0.100 per cent, sulphur, less than 0.050 per cent, manganese, 0.30 to 0.60 per cent, and carbon, 4.00 to 4.25 per cent. Silicon content, although occurring in a fairly broad range of analysis, is usually specified in a 0.30 or 0.40 per cent range. Variation in the analysis considered desirable from plant to plant is determined by various factors. Since oxidation of silicon is the principal source of heat in the bessemer process, these considerations are essentially thermal by nature. They include physical temperature of the iron at charge, converter capacity, amount of iron bearing coolant

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PERFORMS 120 OPERATIONS

	LEFT HAND UNITS	RIGHT HAND UNITS
STATION 1	Load and Turn Over 180 Degrees	
STATION 2	Drill 12 Holes Drill & Chamfer 2 Holes	Drill 14 Holes
STATION 3	Drill 7 Holes	Drill 10 Holes
STATION 4	Drill 3 Holes C'Bore & Chamfer 1 Hole Ream 2 Holes	Drill 2 Holes 11" Deep
STATION 5	Drill 4 Holes Ream 2 Holes Chamfer 11 Holes	Drill 1 Hole Ream 2 Holes Chamfer 16 Holes
STATION 6	Tap 14 Holes	Tap 17 Holes
STATION 7	Unload	
	58 OPERATIONS	62 OPERATIONS

TOTAL — 120 OPERATIONS

PRODUCES 45 BLOCKS PER HOUR... AT 80% EFFICIENCY

This 7-station automatic transfer machine performs a total of 120 individual drilling, chamfering, counterboring, reaming, and tapping operations in a continuous cycle on cylinder blocks for a leading automobile manufacturer. The loading end of the machine is equipped with a turnover fixture that revolves the work 180 degrees, eliminating handling of the piece as it is received from previous machining operations.

Greenlee patented precision-ground individual lead screw spindles tap a total of 31 holes in both ends of the cylinder blocks. All tapping units are provided with a rapid approach and return stroke. Automatic tap lubrication insures clean, precision-cut threads with maximum tool life.

The electrically-controlled hydraulic units are easily accessible for set-ups and for making tool changes, and are designed so they can be independently operated. Ample room is provided between stations for work inspection. Automatic lubrication of each vital moving part assures long machine life and efficient operation.

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materials that can be charged, steam available for coolant purposes, and the blown metal temperature desired. The product of silicon oxidation, silica (SiO_2), being a solid and the major constituent of converter slag also has a bearing on the silicon content specified for blowing iron, since slag consistency is intimately associated with blowing performance.

Phosphorus content remains fairly constant with a given blast furnace burden, depending in amount upon ore content, since only a relatively small portion of this element originates in other burden materials. It also has little bearing on the blowing operation itself, but determines the phosphorus contained in the product since it is not oxidized in the acid bessemer process. In fact, although the amount in the bath does not change, percentage in the blown metal increases because of metallic loss during blowing.

Sulphur contents also are determined by variations in blast furnace burdening and operation, being slightly increased in the blowing operation. In normal percentages no effect on blowing is noticeable, however, with higher values such as used in producing free machining screw steels (over 0.075 per cent sulphur) appearances of bessemer flame is changed.

Manganese contained in blowing iron is generally specified within fairly narrow limits, usually a 0.10 per cent range. The product of its oxidation, manganous oxide (MnO) is a solid and has an important relationship to converter slag consistency. The range specified is determined by the range of silicon specified, since in most plants a minimum ratio of two and one-half parts of silicon to one part of manganese is also specified. Thus a manganese content of 0.50 per cent should be accompanied by 1.25 per cent silicon.

In basic blowing iron, so termed because the blown metal product will receive further treatment in a basic process, such as the basic open hearth furnace, considerably more latitude in chemical analysis is permitted. Silicon content may vary to a greater extent since blown metal temperature control is not so rigid as that required for teeming bessemer ingots. Excessively high temperatures, however, are detrimental due to their erosive effect on ladle and furnace refractories. Phosphorus contents are limited only by ability of the basic treatment to reduce them, and may be as high as 0.5 per cent. Sulphur similarly may be removed by basic treatment, and values in excess of the bessemer iron maximum may be handled. Preliminary treatment of blast furnace iron to remove phosphorus and sulphur by the use of basic reagents is employed successfully to produce blown metal with low contents of these elements.

Other elements such as arsenic, titanium, copper, chromium, nickel, molybdenum, and vanadium may be present to varying degrees in all types of blast furnace iron. Their presence is significant only if they are recovered in the blowing process, and if they affect properties of the steel product.

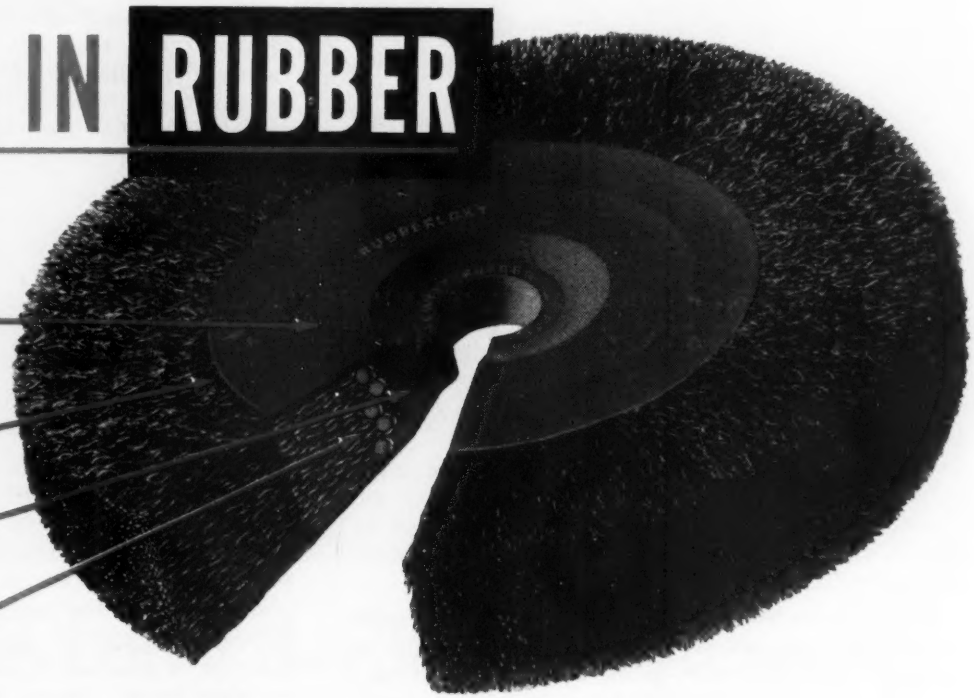
An additional requirement of blast furnace iron for blowing is that it be free from nonmetallic material such as slag. Contamination of the converter charge with blast furnace slag, containing appreciable amounts of lime (CaO) and magnesia (MgO), has a very detrimental effect on blowing performance. Its presence may be precluded by skimming the iron at some stage in handling. Skimming is frequently found to be necessary when iron is withdrawn for use directly from the blast furnace iron ladle, omitting use of a hot metal mixer.

Steel scrap for the converter charge is selected considering its analysis and form. Low phosphorus, low sulphur material can be used to advantage in reducing by dilution percentages of these elements in the charge. Size must be such that no damage to the converter lining will occur during charging, yet attaining the maximum cooling effect from melting. Crops ends from blooms or large semifinished steel sections are commonly used with light scrap considered undesirable. Pig iron, when used as a coolant, may also be selected according to analysis, and variations in molten metal analysis, corrected through use of an appropriate pig iron. Iron oxide bearing materials, such as scale, ore or converting mill refuse are more efficient coolants than metallic materials, since reduction of the oxide consumes comparatively more heat than the melting of a similar weight of metal. The usual form of these substances, however, presents handling problems in some plants, being less adaptable to chute charging than scrap or pig iron. Presence of abnormal quantities of iron oxide in the converter bath, while serving as a supplementary source of oxygen for metalloid oxidation, affects blowing performance adversely.

Relationship between weight of blown metal and coolant in the charge must be predetermined by the operator. Physical temperature and silicon content of the iron are the most important considerations. Generally, an amount of coolant slightly less than

Fig. 8—Charging bessemer blown metal into open-hearth furnace

NOW! A REALLY MODERN WIRE BRUSH...WITH BRISTLES LOCKED IN RUBBER


NO METAL FLANGES TO MAR SURFACES
NO RIGID HINGE POINT TO BEND OR BREAK WIRES
ALL-RUBBER CORE ABSORBS VIBRATION
WIRES COMPLETELY LOCKED IN RUBBER

Due to a new process for imbedding wire in rubber, you can now buy a more efficient kind of rotary wire brush.

It's the HEWITT **RUBBERLOKT** ROTARY WIRE BRUSH . . . with bristles that are *locked in rubber!*

Here are some of the many reasons why you'll say it's a better brush in every way!

Less Vibration—Its special rubber mounting soaks up vibration. So your workers will find it easier . . . and less fatiguing . . . to use on both portable and bench tools.

Easier on Tool Bearings—Less vibration means greater protection for tool bearings and arbor shafts. It means you have less maintenance on those tools, too.

More Brushing Points—Exclusive Hewitt rubber flange keeps bristles in an upright position all during the life of the brush. That provides more brushing points . . . gives you a smoother job.

Better Flare Control—Special rubber flange always brings the wires back to their upright position . . . won't let them bend out or mat down. *Gives brush longer usable life!*

Less Wire Breakage—Rubber mounting reduces bristle ejection. And it also eliminates the rigid hinge point that causes wires to fray and break. Result—*you get a much safer brush!*

Faster, Better Work—Unlike a rigid metal mounting, the Hewitt flexible rubber-locked mounting allows the wires to "give" without bending or breaking. Yet it holds them together compactly under working pressure. So it allows your workers to do a faster, better job . . . even on irregular surfaces.

Investigate the Hewitt **RUBBERLOKT** Wire Brush today. Write Hewitt Rubber Division, Dept. S-4, 240 Kensington Ave., Buffalo 5, N. Y.

Distributors! Your inquiries invited. Some sales territories still available.

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Rotary Wire Brush
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that required to produce the proper blown metal temperature is used, since final temperature adjustment by use of steam can be made after the blow has proceeded. In practice, an average of approximately 10 per cent of the converter charge may be composed of scrap. If economic conditions make it desirable, it is possible to increase this percentage appreciably by increasing silicon content of the iron or by oxygen enrichment of the blast.

Alloying elements that are not oxidized to any extent in the bessemer converter are often added to the charge. Addition at this time tends to produce a more uniform distribution of the element in the finished product than is produced by a ladle addition.

Air blast is turned on while the converter remains in a horizontal position with all of the tuyeres exposed above the bath level to prevent any passage of molten metal into tuyeres and windbox when the converter is rotated to a vertical blowing position. The first passage of air causes ejection of any light foreign material in the charge, such as graphite and "kish". At this time, if a coolant addition has not been made previously, converter and charging chute are swung into position and operation performed.

Elimination of metalloids, silicon, manganese, and carbon is accompanied by oxidation which occurs in the order of their relative chemical affinities for oxygen in the blast, at the existing temperature. Iron is also oxidized throughout the blowing process, probably to the greatest extent at points close to the tuyeres, however, it promptly loses its oxygen to silicon, manganese and carbon as long as they exist in quantity.

Since the product of silicon oxidation is a solid (silica-SiO_2) and silicon is the first metalloid to be oxidized, the first portion of the blow is characterized by lack of a clear, distinct flame and is commonly designated as the silicon blow. Duration of the silicon blow varies directly with the percentage of silicon contained in the iron and may consume from one-quarter to one-half of the full length of the blow. Oxidation periods of each element overlap, since the less oxidizable begins to burn, not when the more oxidizable is completely gone, but when it is largely removed. Thus manganese oxidation commences after the silicon blow has proceeded for some time, and continues as blowing proceeds.

The second distinct stage of the blow commences with evolution of quantities of carbon monoxide from the oxidation of carbon. This gas burns to carbon dioxide at the converter mouth, creating a clear intense flame that lengthens to a maximum height, maintained almost to the completion of carbon oxidation. When percentage of carbon in the bath has been decreased to some low figure, possibly 0.20 to 0.30 per cent, the carbon flame perceptibly decreases in height and intensity, serving as a warning of the approaching completion of the blow.

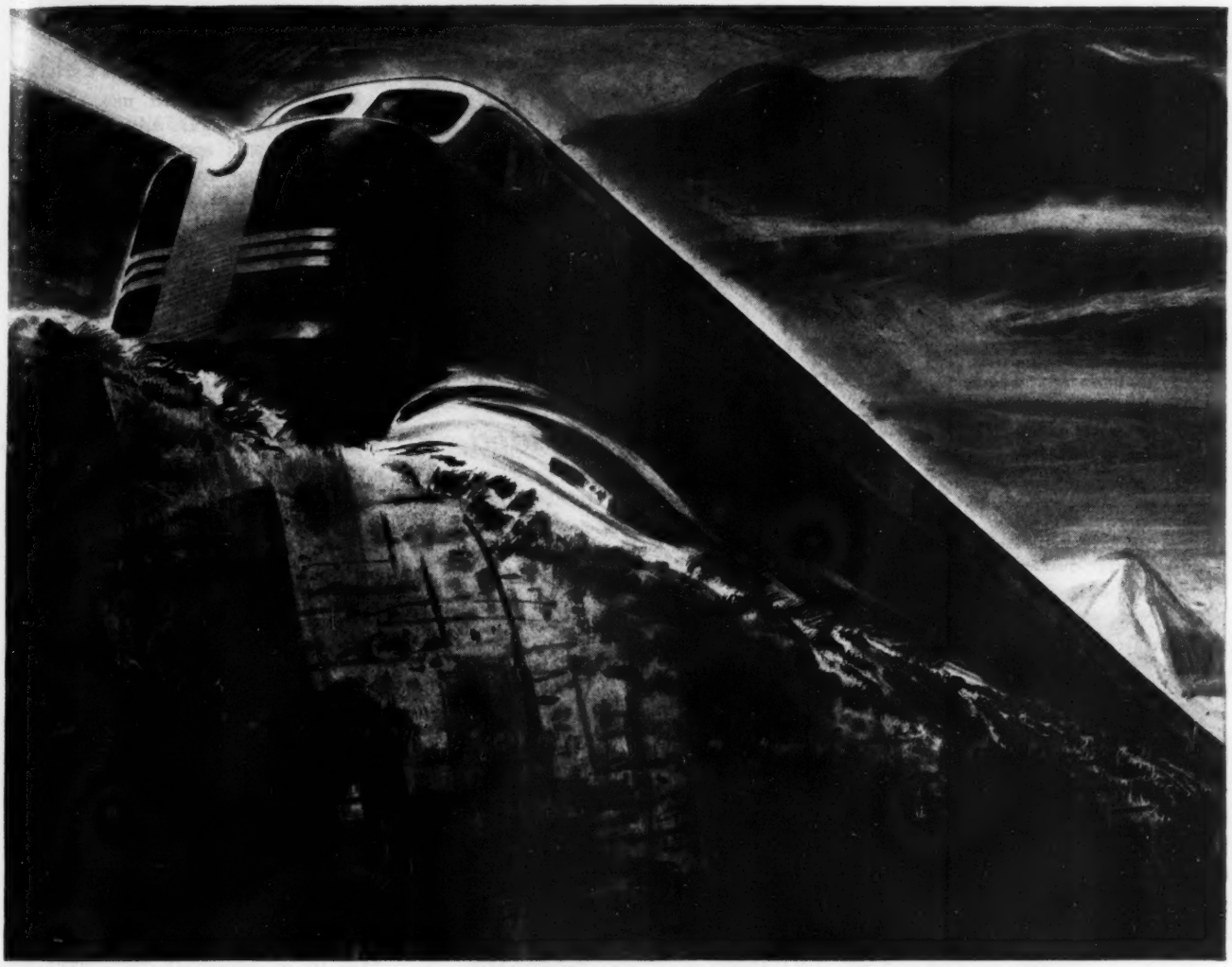
At a point in the flame drop when oxidation of the last portions of carbon is accompanied by an abrupt increase in the oxidation of iron (since all but small residual amounts of silicon, manganese, and carbon have been consumed), a momentary halt in the drop and decrease in luminosity of the flame occurs. This is designated as the endpoint, and occurring in little more than a second's time, is difficult to detect. Since a continuation of the blow beyond this point results in excessive oxidation of iron, its detection may be considered as the most important feature of the operation. Degree of oxidation of the metal bath can be regulated by the volume of air that is permitted to pass through the bath after the endpoint has occurred. This interval, designated as the afterblow, also is of extreme importance, its length being determined by the type of product to be produced.

Converter slag is composed of the oxides of elements eliminated from the bath, contaminating materials accompanying the metallic charge such as blast furnace slag, refractories eroded from iron runner and ladles, and the product of the erosion of the converter lining. Its chemical analysis varies considerably depending upon percentage of silicon and manganese present in the iron, and the extent of iron oxidation. Slag from a normal bessemer blow would have the following approximate chemical analysis: Silica (SiO_2), 55 to 65 per cent, ferrous oxide (FeO), 12 to 18 per cent, ferric oxide (Fe_2O_3), 5 to 8 per cent, manganous oxide (MnO), 5 to 15 per cent, alumina (Al_2O_3), less than 5 per cent, lime (CaO), less than 1 per cent, and magnesia (MgO), less than 0.5 per cent.

The order of its formation follows the order of oxidation of the metalloids, and changes in its consistency as blowing proceeds and various components are added is an important feature of the blow.

Blown metal to be used in the production of bessemer ingots is the result of blowing the heat to completion, or past the end point, since at no time prior to the endpoint can the operation be halted with analysis of the metal predictable within sufficiently accurate limits. Silicon at the endpoint of a normal blow has been reduced to less than 0.01 per cent, carbon and manganese to approximately 0.03 per cent. Phosphorus and sulphur analysis is somewhat higher than in the original charge because of metallic and metalloid loss during blowing. Blown metal also absorbs a small quantity of nitrogen from the blast during the course of the blow, amount depending on the length of blow (or time of exposure to nitrogen in the blast), converter bath depth and blown metal temperature, high temperature favoring retention of nitrogen. Extent of overblowing determines the amount of oxygen in the metal, either dissolved in the form of oxides, or as gas. Metal to be used for duplexing varies in analysis according to practices employed in the basic furnace. In general, two blowing practices are employed to produce duplex metal: (a) Full blowing, permitting the blow to proceed to completion with metal analysis similar to that used for ingots; and (b) high blowing, or turning down the heat before the carbon flame drops. In the latter case, although carbon contents cannot be accurately determined, experienced operators often succeed in furnishing metal within a 0.10 per cent accuracy up to 1.00 per cent carbon.

(To be continued)



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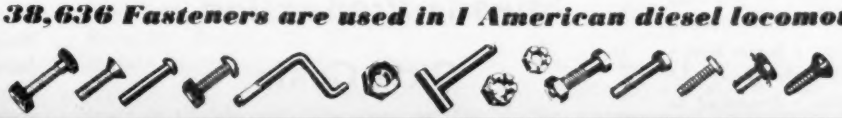

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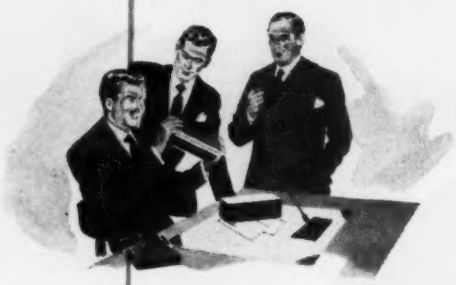

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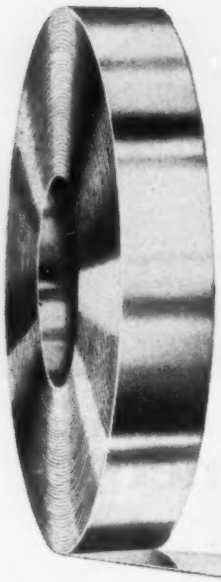
Thus, you by-pass several costly, time-consuming operations . . . and, as a result, enjoy increased output of your finished product at lower unit cost.



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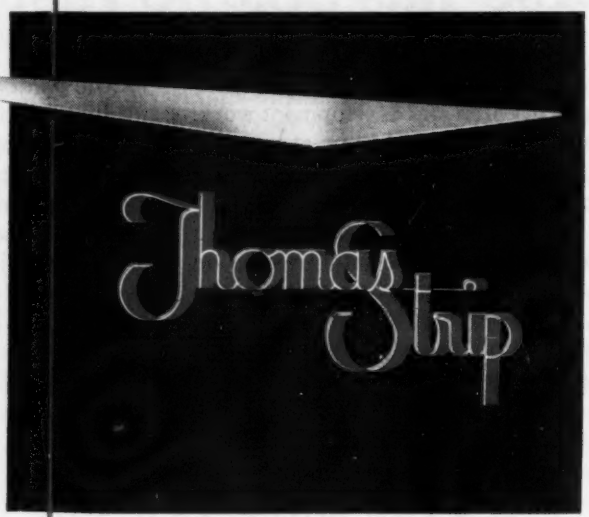

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Radio Reception Not Affected by New Welder

Threat to continued use of high frequency inert gas arc welding in the future was ended recently with the granting of approval by the Federal Communications Commission of a new high frequency welding unit which does not interfere with radio or television reception. Manufactured by National Cylinder Gas Co., Chicago, the unit employs a tube-type oscillator and a specially designed torch. The FCC states that it will remain on the assigned frequency of 27,120 kc regardless of working or weather conditions.

Approval of this unit follows a year and a half of intensive research by welding equipment manufacturers and beats the commission's April 30th deadline for production of high frequency welders that do not cause interference. Previous high frequency welders had uncontrolled frequency characteristics which caused interference with radio communications.

The unit, called the Gasarc, is of the type which adopted since the early war years, welding with an arc shielded by inert gases such as helium or argon. It is used for welding metals such as magnesium, aluminum, copper, bronze, stainless steel and light gage steel and in the production of items ranging from coffee pots to airplanes. The process is said to be especially significant because for some metals it is the only practical welding method thus far developed.

Machine Handles Three Automotive Axle Types

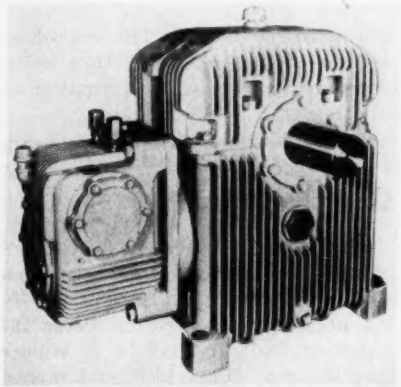
Without changing its setup, a new machine tool bores and faces three types of automotive axle housings. At 100 per cent efficiency, machine, made by Cross Co., Detroit, processes 280 parts per hour using only one unskilled operator.

Three types of axles come to the machine in two different lengths. At the first station, any three of these are loaded and at the second station, both ends are bored and faced with the machine automatically adjusting for length through an electric eye. At the first station the parts are automatically sorted by type and placed on either one of two conveyors, depending upon subsequent processing requirements. One conveyor, which travels at right angles to the machine, receives all axles with insulator brackets attached, either long or short. The second conveyor, a continuation of the work flow through the machine, receives all other axles.

New Products and Equipment

Speed Reducers

Double reduction units comprising over 86,000 combinations as to capacity, model and ratio have been made available by Cone-Drive Division of Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., by using standard speed reducers as primaries and secondaries. The combination of standard reducers provides models



with input ratings of from ½ to 68 hp, from 4000 to 24,400-inch pounds output torque and reduction ratios from 25 to 1 to 4900 to 1.

Standard ratios for primary and secondary reducers can be combined in a number of ways according to operating requirements to give the same overall ratio. Size of primary or secondary reducer can be varied to suit the specific operating conditions. Major differences between standard reducers used in double reduction units and those for single reduction purposes is that primary gear shafts and secondary pinion shafts are slightly shorter. In spite of the large number of possible combinations there are actually only five sizes of primary reducers and eight sizes of secondaries.

Check No. 1 on Reply Card for more Details

Blind Assembly Nuts

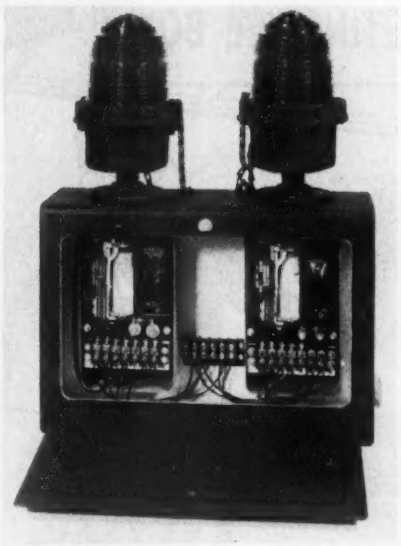
Fasteners which permit complete assembly to be made from one side eliminate the necessity of two operators working on opposite sides of large panels, according to their manufacturer, Tinnerman Products Inc., 2035 Fulton Rd., Cleveland 13, O. These Speed Nuts are inserted into square or round holes and the part to be attached is then placed into position and the screw driven.

Nut locking principle is embodied in the base for a secure vibration proof fastening. The expansion nuts are self-retaining and expand when a tapping screw is inserted. They are produced in two different basic designs, one having spring arms formed to grip at the root of the screw thread, while the other has spring arms turned under to "ride" on the crest of the screw threads.

Check No. 2 on Reply Card for more Details

Gage Light Signal

Self-contained light signal device to be used with model D electrolimit continuous gage or "flying mike" is announced by Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn. It signals the operator of a rolling mill continuous inspection line or a shear by means of lights when the strip metal is off



gage. It can also be used to control an external circuit for classifying.

Device consists of one red and one green lantern, two electronic relays and a suitable mounting case. Limits are set on the contact meter and when these plus and minus limits are exceeded, and electric contact is made through the relays, thus providing control circuit which can be used in controlling mechanisms and lighting lights.

Check No. 3 on Reply Card for more Details

Hydraulic Packing

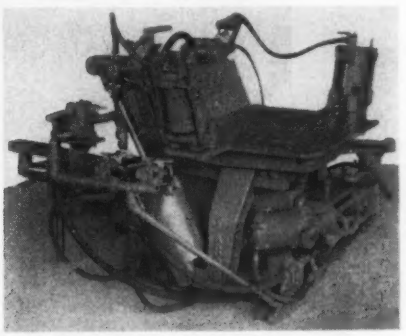
Sealing of various liquids and gases throughout an extremely wide range of temperature and pressure is possible with the multiple duty, hydraulic packing called Monopak, developed by Hydraulic Accessories Co., 439 E. Fort St., Detroit 26, Mich. It withstands temperature from minus 50 to plus 300° F and resists pressure from 0 to 300 psi. Use may be for rods, packed or grooved pistons and is effective on either reciprocating or rotating surfaces.

Each sealing element is composed of two staggered split-rings, cushioned in a ring of resilient synthetic rubber. The rings create a seal at the moving surface, but the cushion ring acts only as a housing seal and never touches this surface. Packing is packaged in individual sets, stamped according to inside diameter, outside diameter and length. It may be obtained in any size from ½-inch ID to 36 inches OD.

Check No. 4 on Reply Card for more Details

Power Draw Machine

Completely power operated, a new 21-inch jar ram power rollover power draw machine is offered by Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa. Machine specifications are as follows: Pattern draw, 8 inches; table, 21 x 28 inches; capacity at 80 pounds air pressure, 450 pounds; rollover cylinder, 5½-inches; draw cylinder, 4½-inches; jar cylin-



der, 5 inches. Space available for pattern board, flask and bottom board is 13 inches.

Check No. 5 on Reply Card for more Details

Wet Grinder

Dressing, touching up or rough flat form grinding of standard tools or small parts may be performed by hand with the No. 1211 and 1212 AB wet power grinder made by Buehler Ltd., 165 W. Wacker Drive, Chicago 1, Ill. Machine uses two wheels which are available in a variety of grits, and is offered in either bench or floor mounted style. Tool or part need not be removed from contact with the wheel for fear of drawing the temper. Wheels are bathed continuously in a clean spray of water or water soluble oil from a recirculating unit equipped with a series of slow motion spill-over type settling tanks.

Operator can continuously inspect the progress of the grind through wide vision safety windows and flood

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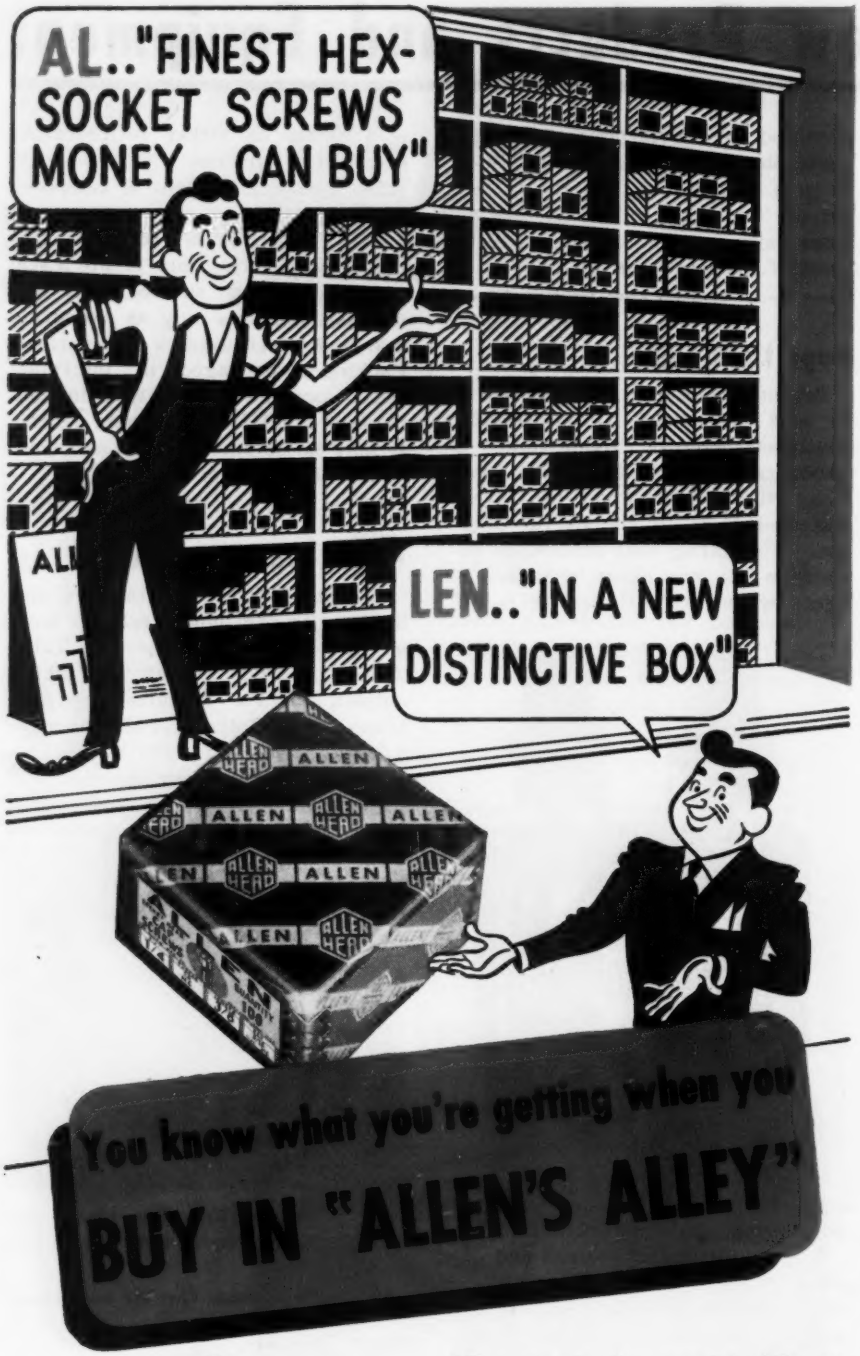
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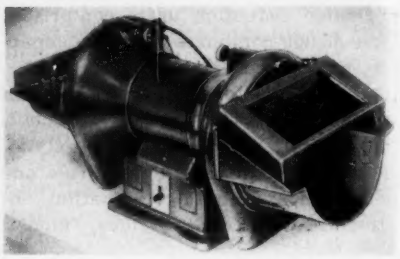
lighted wheel surfaces. Continuous wheel cooling by forced spray keeps loaded metal washed out. Diamond dressing attachment with micrometer adjustment makes posible a close con-

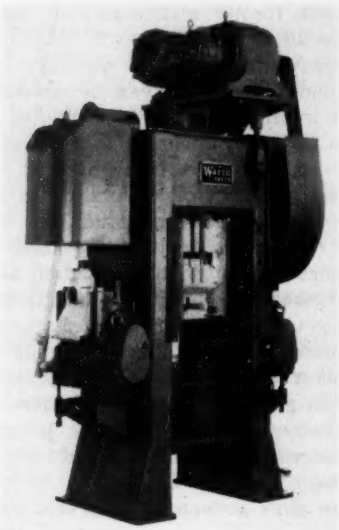


trol of wheel flatness. The wet wheel and its surrounding moisture laden atmosphere prevents the formation of dust hazards.

Check No. 6 on Reply Card for more Details

Stamping Press

Stampings may be produced accurately and at continuously high speeds with the recently designed 75-ton press, built by Warco Press Division of Federal Machine & Welder Co., Warren, O. Welded and stress-relieved steel constructed press has



hand-fitted square gibbing to assure accurate alignment and is equipped with full eccentric shaft with extra long, rigid supporting bearings. Adjusting screw is of the barrel type with a short one piece Pitman, assuring a rigid connection. It has air counterbalancing to reduce shock of "break-through."

All wearing surfaces are assured of proper lubrication by an automatic system. Other features include variable-speed drive, easily accessible adjustments and provision for installation of die cushions if required. Auxiliary equipment includes a precision double roll feed designed for high-

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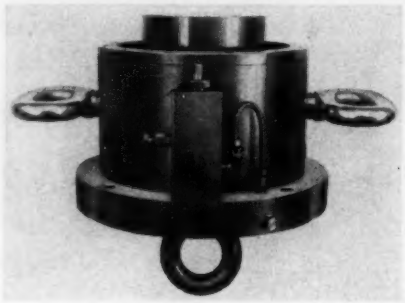
speed operation. Infinite variation is possible in feed lengths. Synchronized scrap shear may be provided if required.

Check No. 7 on Reply Card for more Details

Hydraulic Weighing Cell

Tension loads may be measured as conveniently as compression with the new type Emery hydraulic cell, announced by Baldwin Locomotive Works, Philadelphia 42, Pa. Capacities of three cells in compression are 20,000, 40,000 and 60,000 pounds. Maximum tension loads of half these capacities may be applied on a re-



movable eyebolt screwed into the inside end of the piston, which is made accessible through the closed end of the cell. Cells may be used in any position.

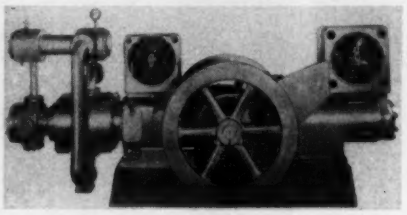
Load ranges of these cells may be as low as 0 to 1000, 0 to 2000 and 0 to 3000 pounds, respectively, when using a Bourdon tube indicator and as low as 0 to 200, 0 to 400 and 0 to 600 pounds when using Tate-Emery indicator or recorder. Other commercial indicators and recorders may be used with these cells. Operation is by slight movement of the piston produced by any load which flexes the diaphragm of the cell and compresses the hydraulic fluid, thus transmitting pressure to the indicator.

Check No. 8 on Reply Card for more Details

Air, Gas Compressor

Large volumes of gas or air may be compressed with the new direct-connected, engine-driven two-stage gas or air compressor, announced by White-Roth Machine Corp., Lorain, O. Known as the Lorain model O-10TS compressor, it consists of a low-stage and a high-stage compressor cylinder driven by a crosshead and a Lorain model O multifuel engine.

Compressor is available with Bosch fuel pump for operation on diesel oil, or with Ensign carburetor and Bosch magneto for operation on natural gas or butane. Conversion may be accomplished on the job in about 90 minutes. Compressor cylinders, with circulating-water cooling system, have top suction and bottom discharge for gas condensates. Engine power cylinder is cooled by circulating water or by a condenser-type system incorporating a fan-driven



belt. Optional equipment includes air starting valves or gasoline-driven friction starter, flywheel guards and steel base.

Check No. 9 on Reply Card for more Details

Explosion-Proof Motor

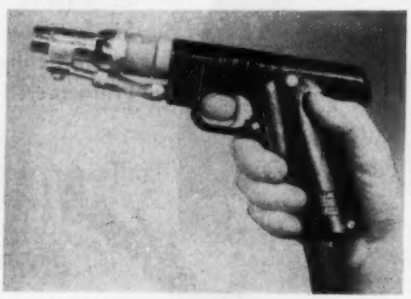
An explosion-proof polyphase motor in ⅓, ½ and ¾-hp sizes has been made available by Ruthman Machinery Co., Cincinnati 2, O., for any gusher pump within this horsepower range. The motors are suitable for use in hazardous locations, having passed the Underwriters' Laboratory test for class I, group D installations

Pumps may be used for handling liquids at 100° in many fields. They have one piece heavy vertical shaft, accurately ground all over, which rotates on sealed ball bearings, lubricated for life.

Check No. 10 on Reply Card for more Details

Spot Welding Torch

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y., has developed a portable inert-gas-shielded spot welding torch which makes possible the application of spot welds



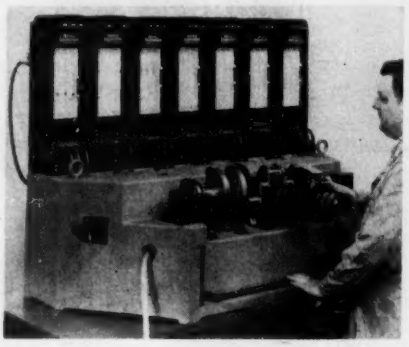
from only one side of the work without the necessity of backing the weld location. Mild steel, low alloy and stainless steel from 0.030 to 0.064-inch thick can be welded using current from 155 to 250 amperes. Two sheets of these metals can be joined in 1 to 2 seconds per spot, or one sheet can be joined to underlying material of any thickness.

Torch is useful where the structure is large or of complicated shape because welding is done from one side and no forging pressure is required. Argon gas shields the electrode and weld area to prevent oxidation. Welding duration and argon flow are controlled by a separate timer unit. Standard hose assembly for the Heliarc HW-8 torch is 25 feet long and 1 inch in diameter, containing conductors for power cable, cooling water, shielding gas and trigger control.

Check No. 11 on Reply Card for more Details

Crankshaft Gage

Sheffield Corp., Dayton 1, O., is manufacturing a gaging machine which uses 20 Precisionaire tubes for the accurate checking of an automobile crankshaft for size and out-of-round. The five main bearings are



checked simultaneously with five Airsnaps, each having three sets of jets so as to gage midway between the flanges and at ⅛-inch from each flange. The Airsnaps are floated so that they may move forward or backward to allow for misalignment due to possible warpage in the crankshaft.

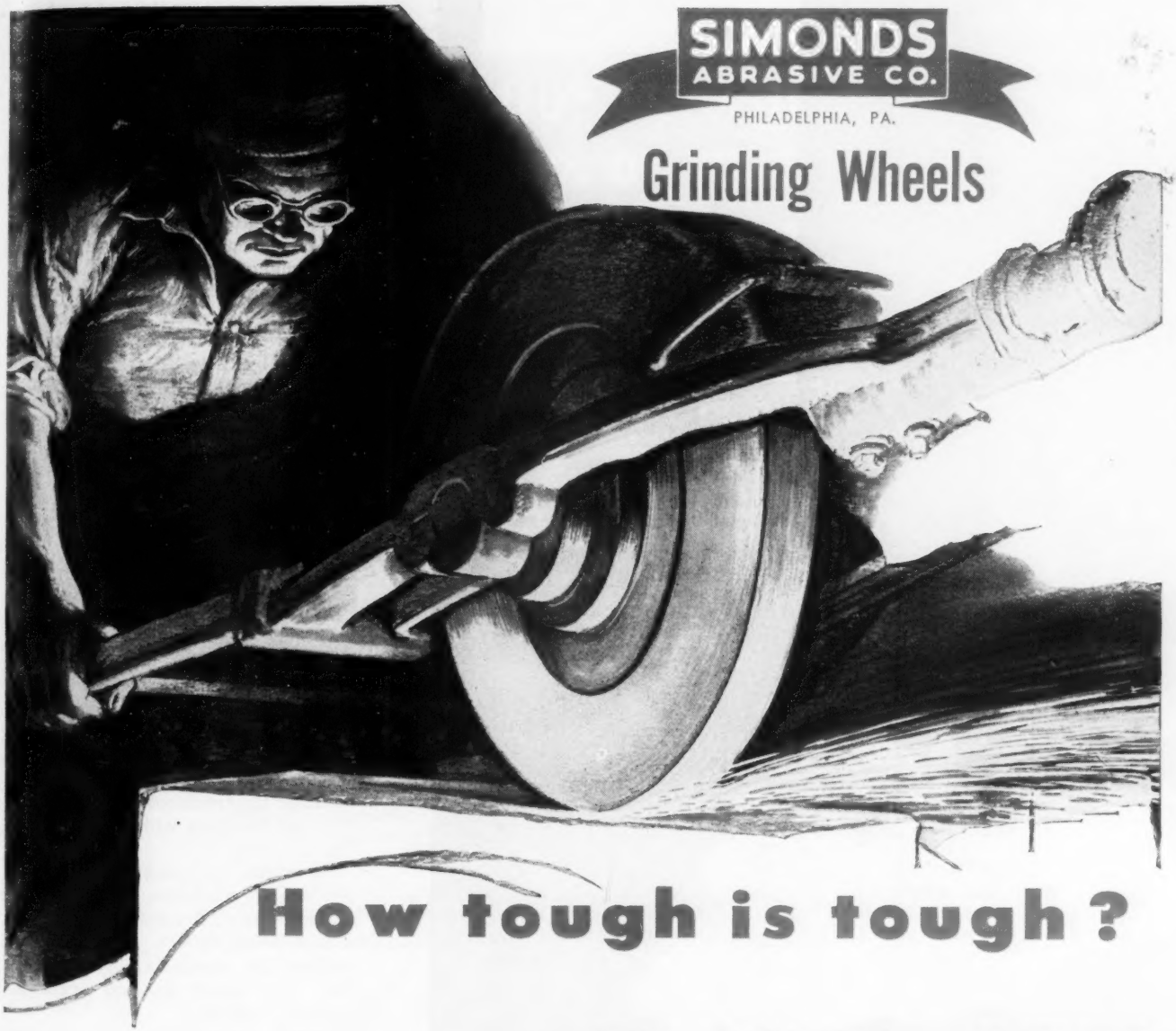
At the same time two other jets check the seal diameter at one place and the width of rear main bearing. Diameter at each end of the pin bearing and the breakdown of the radius at the checks are checked manually with an individual Airsnap having three sets of jets.

Check No. 12 on Reply Card for more Details

Electron Photometer

Selective wide range of sensitivity, linear response, measurements in the ultraviolet and visible region and dark current balance control are features of the electron multiplier photometer designed for general purpose measurement of very low light intensities, made by Farrand Optical Co. Inc., 4401 Bronx Blvd., New York 66, N. Y. Interchangeable photomultiplier tubes afford high sensitivities and are used as detectors, obviating the need for additional amplifiers.

Device is composed of three units:



How tough is tough?

A grinding wheel is tough . . . plenty tough when it takes the severest operating use at 9,500 surface feet per minute . . . yet cuts fast and stands up to give you lowest wheel cost per pound of metal removed.

That's what you get from Simonds Abrasive Co. Snagging Wheels for cleaning castings and billets . . . as well as from other kinds of Simonds Abrasive Wheels used in the precision grinding field.

Send for your copy of our Grinding Wheel Data Book giving complete information including recommendation tables and address of nearest distributor equipped to serve you locally.

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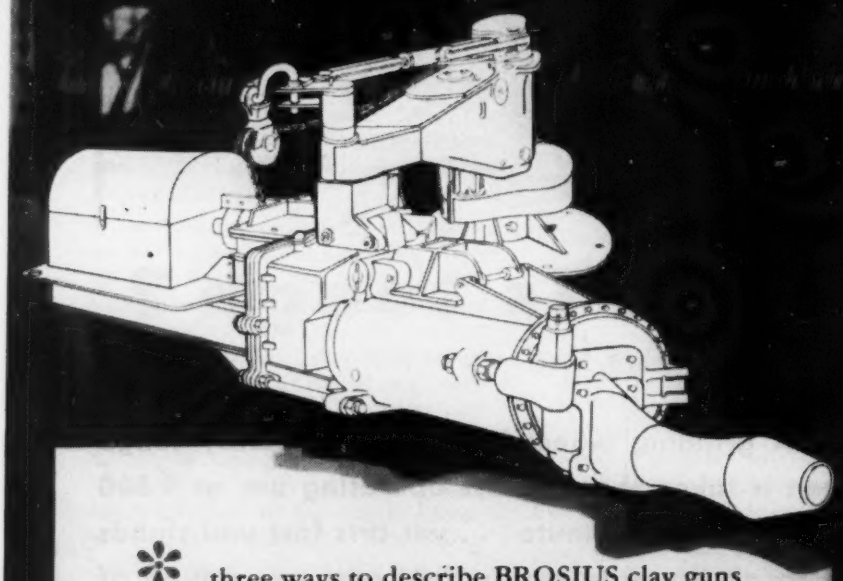


* three ways to describe BROSIUS clay guns in operation at the blast furnace tap hole. For 31 years BROSIUS engineers have diligently applied their experience to the design and production of efficient low-cost guns. That's why so many BROSIUS guns have been working so long—so well. Available electric, electric-hydraulic, steam—pedestal or column mounted. For fast, sure, safe guns—please write to us.

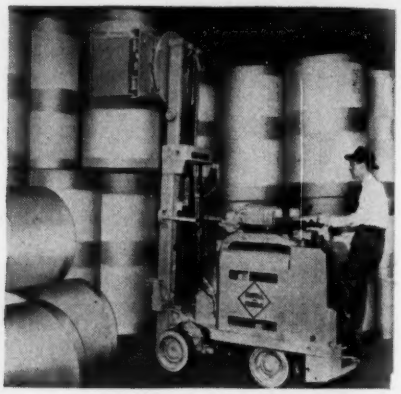
Edgar E. BROSIUS Company Inc.
SHARPSBURG • PITTSBURGH 15, PA.

Detector, power supply and controls, galvanometer. This arrangement makes it possible to use the instrument directly or attach it to various instruments.

Check No. 13 on Reply Card for more Details

Roll Handling Device

Rolled material, casks and drums may be picked up, transported, stacked or changed from vertical to horizontal position with the two steel arms of semicircular contour on the new power truck attachment announced by Elwell-Parker Electric Co., Cleveland, O. The unit, which is



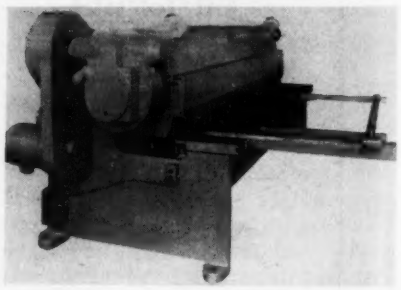
bolted to the truck rotary mechanism, does not interfere with driver visibility.

Hydraulic clamping action of the two arms, controlled by the truck operator, is sufficiently firm to hold a 2000-pound object. Surfaces that contact the objects are rubber padded. The device has an adjustable pressure control.

Check No. 14 on Reply Card for more Details

Squaring Shears

New series of steel squaring shears, announced by Columbia Machinery and Engineering Corp., Hamilton, O., features speed and accuracy of gage



setting and shearing, motor-operated precision back gage, solenoid-operated clutch controlled by a moveable foot switch and low overall height. Rigid welded rolled steel construction affords greater strength with reduced weight and permits use of lighter foundations. All shears in the

IDEA to Make Selection Easier

TWO ALLOY STEELS THAT CAN MEET 95% OF YOUR NEEDS

ROCKWELL HARDNESS	WHAT YOU GET	HOW TO USE IT
C-62		
55	***use Carpenter No. 158 Case-Hardened***	A case-hardening alloy steel for parts demanding an extremely hard surface. Resistance to shock also important. When you need these, there is only one "best" steel to use.	Use No. 158 annealed. Machine parts, then carburize and harden. Result—high case hardness and core strength.
50	***use Carpenter No. 5-317 Hard-Tempered***	A hard-tempering alloy steel to take a good gear temper. Combination of good surface hardness with strength and toughness. (Rockwell C-47/55. Brinell 450/550).	Use No. 5-317 annealed. Machine and heat treat. Draw between 400° F and 650° F for desired hardness.
45		
40	***use Carpenter No. 5-317 Tough-Tempered***	A tough-tempering alloy steel to take a good shaft temper. Where strength and toughness are needed. (Tensile 150,000 to 250,000 p.s.i. Rockwell C-32/46. Brinell 300/450).	Use No. 5-317 annealed. Machine and heat treat. Draw between 650° F and 1050° F for desired hardness.
35		
30	***use Carpenter No. 5-317 as Heat Treated at Mill***	A mild-tempered alloy steel that can be readily machined in the treated condition as received. (Rockwell C-24/31. Brinell 250/300).	Use No. 5-317 as heat treated at the mill. Machine parts and put into service without any further heat treatment.
25		

Good Way to SAVE on Maintenance Jobs

These two steels are widely used for gears, shafts, collets, cams, bolts, etc.

HERE'S USEFUL INFORMATION about the jobs these 2 steels can do for you. To compare these 2 steels with the S.A.E. alloys you are now using, write for a personal copy of the booklet, "2 Steels Simplify Your Alloy Needs".

RUSH **DELIVERY FROM CARPENTER WAREHOUSES**

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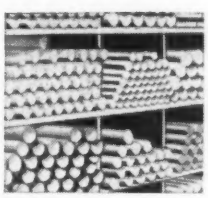

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new series feature a worm-gear drive.

The high-carbon, alloy-steel clutch, with six jaws, is bolted to the web of the worm gear and operates on the large squared end of the eccentric shaft. Automatic hydraulic hold-downs grip the work firmly before the blade begins to cut. Other features include: Front adjustment of the slide or upper slide holder; long, uninterrupted slideways; and centralized one-shot lubricating system. Shears are offered in seven sizes for shearing ⅜ to 1¼-inch mild steel in 6 and 10-foot lengths. Three other models are for shearing of 3/16-inch mild steel, 10 and 12 feet long and ¼-inch by 6 foot.

Check No. 15 on Reply Card for more Details

Cast Steel Valves

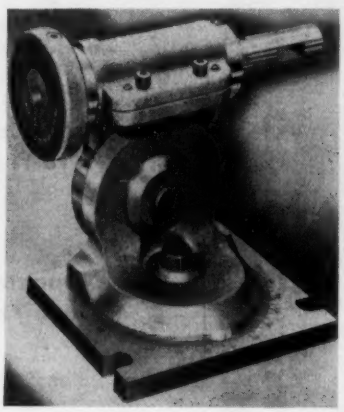
Newly designed cast steel valves, developed by Edward Valves Inc., East Chicago, Ind., make possible installation of smaller valves in pipe lines. Stop and nonreturn valves in either the globe or angle design use the new body for all sizes 6 inches and above in 900, 1500, and 2500 pound classes. They are available with pressure-seal or bolted bonnet and with flanged or welding ends.

Valve pressure loss is decreased by streamlined internal contours which eliminate wear producing turbulence, by reduction of weight in all floating parts, and by equalization of pressures in all internal areas. The integral seat composed of Stellite laid directly on the valve body reduces weight because it makes possible a smaller body bore.

Check No. 16 on Reply Card for more Details

Grinding Fixture

Run of the shop jobs, such as grinding of cutting edges, steps, flutes and chip relief on roughing and cutting reamers, milling cutters, chamfering tools and turning tools, and reamers may be performed with the grinding



tool announced by Madison Mfg. Co., Muskegon, Mich. Fixture is graduated in degrees in all three planes and offers automatic indexing for Madison tools and any other where 180 degree indexing is required.

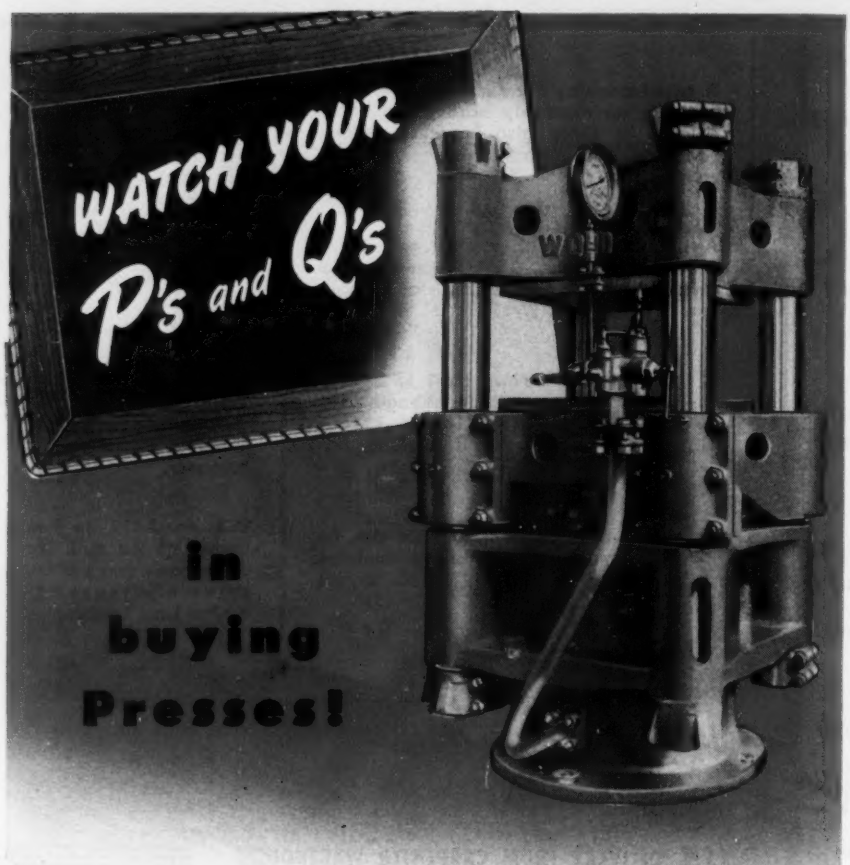
Arbors for all sizes of Madison cutters (both roughing and reaming), for single point tools and milling cutters are available. Special arbors may be obtained if needed. Also offered is a wooden box which holds the fixture and up to eight arbors.

Check No. 17 on Reply Card for more Details

Fork Truck Attachments

A high-lift low-clearance device, the Hi-Lo Stack, is now offered on gas and electric battery-powered Clipper fork lift trucks of 2000 pound capacity, made by Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich. The lifting device permits an overall collapsed height of 83 inches, a maximum lift of 130 inches and a "free lift" without increasing the overall height of the machine.

These heights make possible operation through 7-foot-high door openings and the tiering of unit loads to the ceiling of boxcars with low clearance. Device improvements include



PRECISION:

You want a precision-made press—one that does a precision job. You can count on R. D. Wood hydraulic presses for both! The 1000-ton molding press shown is an example. Used for molding a variety of products, and just one of an extensive R. D. Wood line, it proves in operation that precision means less maintenance cost, greater operating efficiency, and a consistently better job.

QUOTAS:

You want a press that can stand up to modern plant production quotas. R. D. Wood presses are built to meet these demands. Rigid, rugged and reliable, they're *specifically designed* to meet strict production schedules. Write for literature today on hydraulic presses, or *any* hydraulic press problem. R. D. WOOD COMPANY, Public Ledger Building, Independence Square, Philadelphia 5, Pa.

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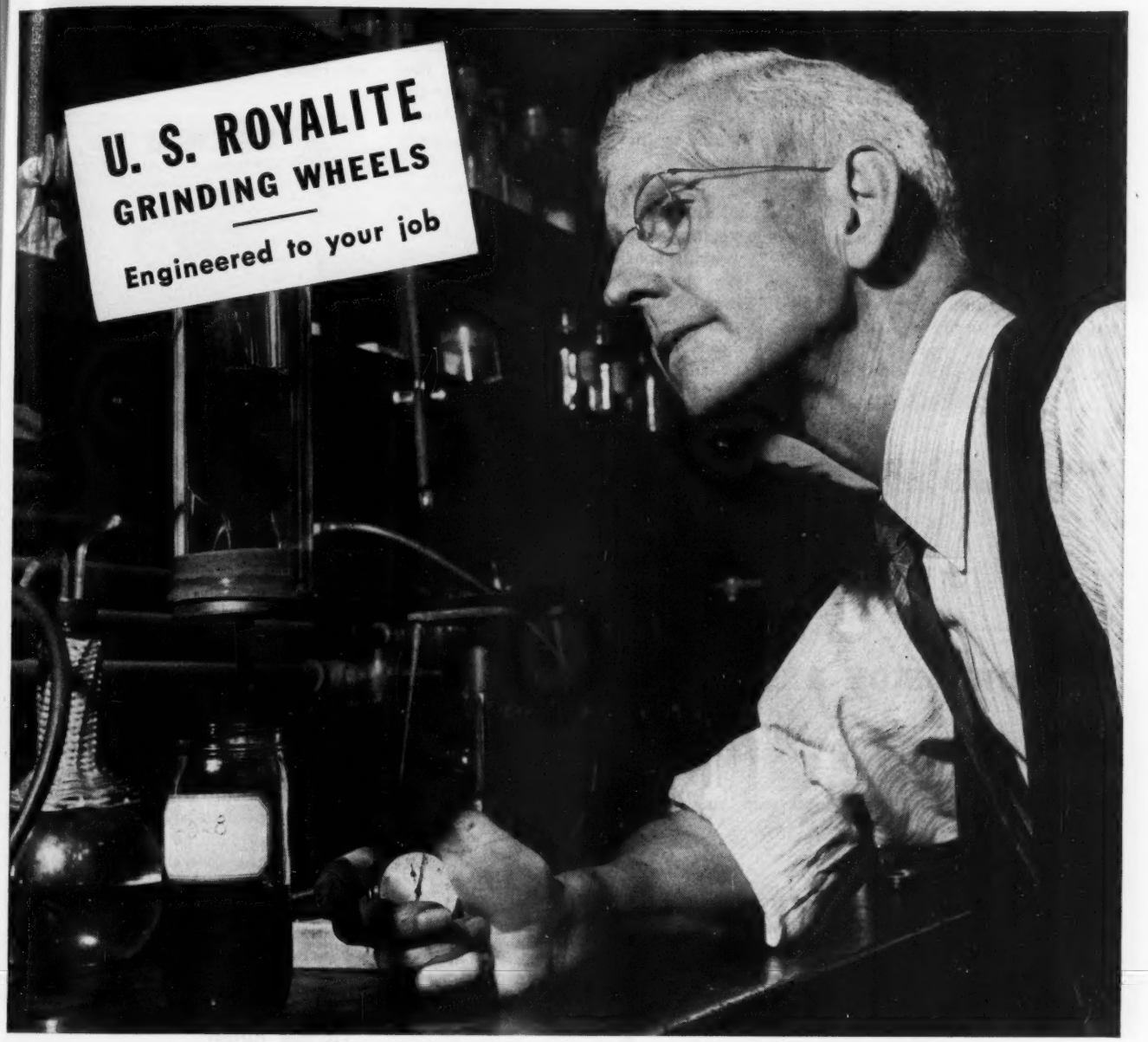
PUBLIC LEDGER BUILDING, PHILADELPHIA 5, PA.



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You're looking at a test of the kinetic viscosity of liquid resin—one of many tests made to be sure you get a grinding wheel that is just what you've asked for . . . and more.

The purpose is always the same—*more production at lower cost*. We draw from our immense research facilities in every conceivable phase of abrasives and bonds. In addition, we have at our disposal the vast research data covered by the thousands of other products made by United States Rubber Company.

That is why we can deliver U. S. Royalite Grinding Wheels that are precisely engineered to your job, whether you're snagging castings, grinding ball races or working with billets, bits, slabs or sauce-pans. We can give you accurate grinding wheel costs in advance—by means of thorough field tests made by our engineers right in your own plant.

For more information, write United States Rubber Company, Grinding Wheel Dept., Fort Wayne 4, Indiana.

U. S. GRINDING WHEELS—ORIGINATED IN 1863

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SERVING THROUGH SCIENCE

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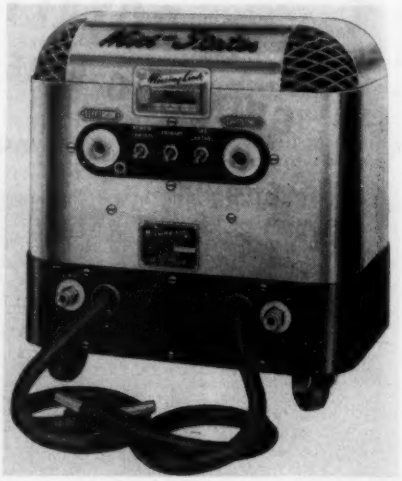
a single hydraulic lift cylinder and a single set of uprights, and a balanced hydraulic system for lift operation.

Check No. 18 on Reply Card for more Details

Arc Stabilizer

Reduction or elimination of most radio interference resulting from high frequency arc stabilized welders is claimed for a new circuit and a "remote control" incorporated into the Missing Link automatic arc stabilizer, manufactured by Mid-States Equipment Corp., 2429 S. Michigan Ave., Chicago 16, Ill. The new circuit markedly reduces radio frequency radiation and the control automatically cuts off operation when the welding arc is broken. A finger-tip switch, mounted on the electrode holder is flicked on to resume operation.

Elimination of the idling time due to absence of grounding when not welding also results in cooler, longer-wearing spark gap points. The stabilizer can be used with metal arc, gas shielded arc, carbon arc, Heliarc or spot arc welding processes. It makes possible the use of any welding rod, alternating or direct current, bare or coated. Built in gas and water valves and automatic control of gas afterflow to protect tungsten electrodes while cooling are optional features for Heliarc and inert gas shielded welding processes.



Check No. 19 on Reply Card for more Details

Impact Air Hammer

Announced by Mead Specialties Co., 4114 N. Knox Ave., Chicago 41, Ill., is a model 105 impact air hammer which has a capacity of approximately 15,000 pounds at point of impact. Working surface of hammer table is 7 x 9 inches, overall height is 44⅛-inches, throat depth is 4½-inches, maximum daylight opening is 18 inches and the maximum stroke is 8 inches.

Check No. 20 on Reply Card for more Details

Thread Roller

Ability to roll continuous threads, knurls, or serrations is a feature of the new heavy-duty model C precision thread roller, announced by Watson-Flagg Machine Co. Inc., 845 E. 25th St., Paterson 3, N. J. A heavy frame allows a 72 per cent higher hydraulically-applied rolling pressure to accommodate higher physical properties of material, greater diameter and pitch thread sizes, as well as increased length of work. Diameters

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PAINT

HALFWAY protection is worse than none where corrosion is a problem. Ordinary paints provide only a shield behind which corrosion goes on, uninterrupted. Be sure. Play safe. Protect your plant and its equipment with the paint proven over a 10-year period as the paint impervious to attack by most acids and alkalies.

Tygon *corrosion-resistant plastic* Paint is made of chemically inert plastics. It air dries quickly . . . forms a tough, durable, tight-adhering plastic film that *will not* support combustion . . . that *will* resist impact and chipping . . . that *will* provide effective protection against corrosive fumes and gases long past the life of even the best industrial paints.

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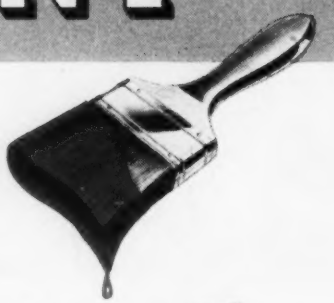

RESISTS ACIDS, ALKALIES, WATER, ALCOHOL

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The 7,500,000 workers who are each investing on the average of $20 per month in Savings Bonds

The employees who serve as volunteers selling U. S. Savings Bonds to their fellow employees

Here's a sales force that's helping to win economic peace of mind for the nation. It already has dealt heavy blows to inflation, fear, and doubt. *This sales force is comprised of people who really are doing something to build security and protect the American way of life.*

They are building security for themselves by buying Bonds. Every $3 they invest will pay $4 at maturity.

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They are building security for the nation. Savings Bond dollars are deferred purchasing power—an assurance of good business to come. The Treasury uses net Savings Bond dollars to fight inflationary credit potential in the banking system by retiring short-term bank-held Federal securities.

If your company isn't an active part of this sales force, better join now and get in on the benefits! Full information is available from your State Director, Savings Bonds Division, U. S. Treasury Department. Phone him or write the Treasury Department, Washington 25, D. C.

The Treasury Department acknowledges with appreciation the publication of this message by

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from 0.138 to 4 inches with a maximum of 8 pitch may be handled.

Regular length of thread capacity, when through-rolling is not being used, is 2¼-inches standard, 3¼-inches maximum. Threads, knurls or serrations are formed as the blank is rotated between two cylindrical dies of 6½-inches diameter which provide high surface rolling speeds of 200 to 540 fpm. Complete job changeover can be made in an average of 30 to 45 minutes.

Check No. 21 on Reply Card for more Details

Vertical Sander

Weighing about 8½-pounds and having an overall height of 7 inches, a new vertical sander, announced by Buckeye Tool Corp., Dayton 1, O., is reported to be suited for precision work because of its ease of handling. It is also designed for use as a grinder

with cup type, counterbored center wheels and cup wire brushes. Tool is available in free speeds of 4500, 5500, 6000, 7200, and 8500 rpm. It is equipped with a Stream-Power governor which assures constant speed under load.

Check No. 22 on Reply Card for more Details

• • •

CALCULATOR: For computing job ticket and piece work time, Time-Tab Inc., Los Angeles, Calif., offers a calculator called Time-Tab. Based on the slide-rule principle, it is a two-rule calculator housed in a triangular case measuring 20 x 3 inches. It is available in three precision calibrations—quarters, tenths or twelfths of hours.

Check No. 23 on Reply Card for more Details

CLEANER: Hanson-Van Winkle-Munning Co., Matawan, N. J., has developed a new cleaner designated as Matawan No. 25W. It is a non-silicated soak or electro cleaner especially suitable for applications where the presence of a silicate in the solution would interfere with subsequent processing. It may be used on steel, copper, brass, lead base castings or die castings.

Check No. 24 on Reply Card for more Details

CUTTING TORCH: A small torch for all light welding and cutting, designated as the Meco Aviator Jet, is offered by Modern Engineering Co., St. Louis, Mo.

Check No. 25 on Reply Card for more Details

TEMPLATE: No. 60 Dimensioner template speeds up callout, dimensioning and lettering of drawings. All symbols and sizes conform to standard drafting room practice. It is available from Rapidesign, Glendale, Calif.

Check No. 26 on Reply Card for more Details

CIRCUIT INTERRUPTERS: Square D Co., Detroit 11, Mich., announces circuit interrupters in cast iron enclosures. They are identical to corresponding circuit breakers, but do not have thermal and magnetic trip features.

Check No. 27 on Reply Card for more Details

PORTABLE FLOOD LAMP: Keller Laboratories, Oneida, N. Y., offers the Light-King, a portable flood lamp with an extendable trouble or utility light. Two free running reels permit a working radius of 52 feet from nearest electric outlet.

Check No. 28 on Reply Card for more Details

SOLIDS INTERCEPTOR: To prevent fragments of solids present in waste water from flowing into building drainage lines, a solids interceptor has been developed by J. A. Zurn Mfg. Co., Erie, Pa.

Check No. 29 on Reply Card for more Details

HOISTS: A new line of Auto-Bloc lightweight, heavy duty hoists is announced by David Round & Son, Cleveland, O. It is available in 16 standard models of ½ to 40 ton capacity. The hoisting mechanism employs only two gears: A cam actuated floating inner gear and an outer gear to which load sheave is connected.

Check No. 30 on Reply Card for more Details

WEIGHT PRINTER: A weight printer offered as an integral part of Load King industrial scales by Yale & Towne Mfg. Co., Philadelphia, Pa., prints actual weights in numerals 9/32-inch high without additional printing or mental calculation. Various weights in a series can be identified by printing opposite recorded weight from one to eight symbols, numerals or letters. Printer operates on 100 v, 60 cycle, single phase, alternating current.

Check No. 31 on Reply Card for more Details

STARTER AND CONTACTOR: A new magnetic motor starter and magnetic contactor designed to give maximum protection to alternating current motors up to 50 hp, 440 v, is offered by Trumbull Electric Mfg. Co., Plainville, Conn.

Check No. 32 on Reply Card for more Details

TORCH: Designed for all soldering, brazing and heating operations, the Crown torch made by Sully Engineering Ltd., Los Angeles, Calif., is a completely self-contained heating torch that burns either butane or propane gas.

Check No. 33 on Reply Card for more Details

ISOLATING PASTE: Known as Isopac, a paste that is applied to sections to be kept soft and left in place while the work is case hardened has been developed by Denfis Chemical Laboratories Inc., Brooklyn 2, N. Y. It prevents penetration of carbon gas and insulates protected section to prevent rapid cooling.

Check No. 34 on Reply Card for more Details

PROTECTIVE SHIELD: The Heat Mast, manufactured by Mine Safety Appliances Co., Pittsburgh 8, Pa., affords full face and head protection with unobstructed vision for workers around blast furnaces, cupolas, heating furnaces, soaking pits and similar heat areas.

Check No. 35 on Reply Card for more Details

WELDING CONTROL: A single phase to single phase low frequency electronic welding control that has a lower kilovolt-ampere demand and a higher power factor than standard single phase to single phase control is available from Westinghouse Electric Corp., Pittsburgh 30, Pa. It makes possible welding of scaly or rusty steel with a minimum of spitting from electrodes and can be used for welding brass or aluminum.

Check No. 36 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

DOWNTREND in steel demand continues with market opinion mixed as to the velocity of the decline. Some steelmakers note a leveling-off tendency but others see no change in the rate of contraction and still others, including sellers with diversified lines, describe the situation as "snowballing." More premium prices have been adjusted downward but standard mill quotations have not yet been affected despite substantial contraction in buying with some consumers apparently restricting purchases hoping for reductions in published schedules as demand and supply come into balance.

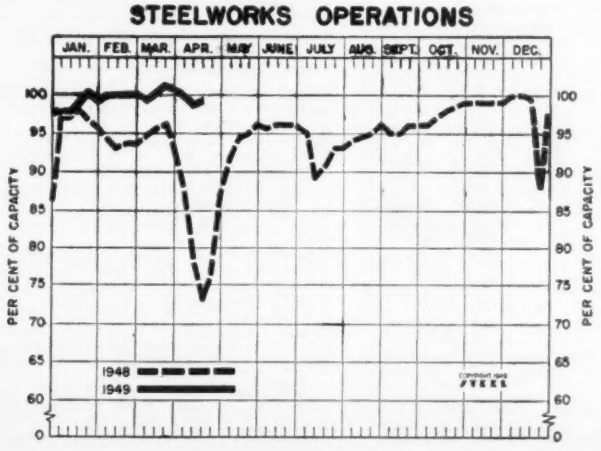
DEMAND— Consumers are exercising extreme caution in placing orders, buying only for definite requirements. They have become noticeably price-conscious and are reducing inventories as rapidly as possible. As a result pressure for deliveries has eased in virtually every section of the market with mill order backlogs shrinking. Most sellers of sheets, strip, pipe, plates and carbon bars so far have been able to fill gaps in rolling schedules occasioned by order cutbacks and cancellations, but in general the situation is distinctly spotty with many buyers finding their inventories excessive for today's reduced rate of manufacturing. Premium-priced producers are finding it increasingly difficult to keep their mills engaged and some suspensions are reported. Some conversion business is still noted but it is on a greatly restricted basis as compared with only a few months ago, and a number of conversion ingot producers have been forced to close down or curtail operations.

ALLOCATIONS— Reflecting the betterment in steel supply and shrinking demand, the government's voluntary allocation program beginning in July will be almost halved. As result of approved cuts in the separate programs, allocations will total 272,244 tons monthly during third quarter as compared with 442,415 tons in the current quarter. Sharpest reduction will be in the freight car program which has been taking 174,953 tons monthly. Beginning with July this allocation will be suspended except for 25,000 tons which will be provided for unforeseen consumer needs. Suspension of this allocation is due to the virtual drying up of new freight car orders. Further reflecting the easier steel supply conditions was the relaxing of export restrictions last week.

PRICES— Pressure on established standard steel price schedules is mounting but except for the retreat of premium-priced producers to levels more in line with the standard market, and the sharp reductions on gray market offerings, no significant changes have been effected in listed quotations to date. Some adjustments have been made in standard mill quotations on galvanized products to reflect the lower prices now prevailing on zinc. Premiums have just about disappeared on pig iron with sellers scratching for business in the merchant market. Scrap continues to sink to lower levels with the mills and foundries still restricting purchases. There is as yet no sign that the bottom has been reached in scrap which has undergone a price decline without precedent in the industry's history in the face of capacity steel mill operations. For the most part consumers are of the opinion standard steel products prices will be next to give way though they do not look for a severe test of strength until midyear. Much depends on labor developments, with a coal mine strike a possibility, and steel wage negotiations a factor that will figure prominently in developing future price policy.

COMPOSITES—STEEL's composite price averages last week generally held unchanged from the previous week and compared with those for the like 1948 week as follows: Finished steel, $94.91 and $81.14; semifinished steel, $69.02 and $68.72; steelmaking pig iron, $46.22 and $39.18. Continued weakness in steelmaking scrap prices in the leading districts resulted in a further drop in the composite for that commodity to $24.08 from $25.50 the previous week.

STEELWORKS OPERATIONS



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended April 16	Change	Same Week 1948	Same Week 1947
Pittsburgh	98	None*	72	99
Chicago	99	± 0.5*	86.5	96
Eastern Pa.	94	— 0.5	61	90.5
Youngstown	105	None	50	86
Wheeling	95.5	None	82	93.5
Cleveland	100.5	— 1	96	95
Buffalo	104	None	64	88.5
Birmingham	100	None	41	99
New England	88	None	80	95
Cincinnati	104	None	85	82
St. Louis	84.5	+ 7	89.5	87.5
Detroit	107	None	101	92
Western	101.5	— 0.5	..	..
Estimated national rate	99	+ 0.5	73	95.5

Based on weekly steelmaking capacity of 1,843,516 net tons for 1949; 1,802,476 net tons for 1948; 1,749,928 tons for 1947. * Revised.

COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Apr. 16	Apr. 9	Month Ago Mar. 1949	Year Ago Apr. 1948	5 Years Ago Apr. 1944
Finished Steel	$94.91	$94.91	$97.17	$81.14	$56.73
Semifinished Steel	69.02	69.02	73.51	68.72	36.00
Steelmaking Pig Iron	46.22	46.22	46.22	39.21	23.00
Steelmaking Scrap	24.08	25.50	34.60	40.41	19.17

FINISHED STEEL WEIGHTED COMPOSITE†

Mar. 1949	4.04073c
Feb. 1949	4.06149c
Jan. 1949	4.05394c
Mar. 1948	3.63079c
Mar. 1944	2.42750c

* **STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide mill prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (re-rolling billets and slabs, sheet bars, skelp, and wire rods, on Basic Pig Iron (at eight leading producing points), and on Steelworks Scrap (No. 1 melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composites, dollars per net ton; pig iron and scrap, gross ton.

† **FINISHED STEEL WEIGHTED COMPOSITE:** Computed in cents per pound, mill prices, weighted by actual monthly shipments of following products, representing about 82 per cent of steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Structural shapes; plates, standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. March, 1949, figure is preliminary.

COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton, others dollars per gross ton. Delivered prices represent lowest from mills.

Finished Materials

	Apr. 16, 1949	Mar. 1949	Jan. 1949	Apr. 1948
Steel bars, Pittsburgh mills	3.35c	3.43c	3.45c	2.90c
Steel bars, del. Philadelphia	3.8164	3.8164	3.8094	3.356
Steel bars, Chicago mills	3.35	3.35	3.35	2.90
Shapes, Pittsburgh mills	3.25	3.27	3.275	2.80
Shapes, Chicago mills	3.25	3.25	3.25	2.80
Shapes, del. Philadelphia	3.4918	3.4918	3.4888	2.968
Plates, Pittsburgh mills	3.50	3.50	3.50	2.95
Plates, Chicago mills	3.40	3.40	3.40	2.95
Plates, del. Philadelphia	3.6348	3.7256	3.7217	3.19
Sheets, hot-rolled, Pittsburgh mills	3.25	3.275	3.275	2.80
Sheets, cold-rolled, Pittsburgh	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Pittsburgh	4.40	4.40	4.40	3.95
Sheets, hot-rolled, Gary mills	3.25	3.25	3.25	2.80
Sheets, cold-rolled, Gary mills	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Gary mills	4.40	4.40	4.40	3.95
Strip, hot-rolled, Pittsburgh mills	3.50	3.50	3.50	3.05
Strip, cold-rolled, Pittsburgh mills	4.375	4.375	4.375	3.80
Bright basic, wire, Pittsburgh	4.15	4.255	4.325	3.775
Wire nails, Pittsburgh mills	5.20	5.545	5.775	5.20
Tin plate, per base box, Pitts. dist.	$7.75†	$7.75†	$7.75†	$6.80

Semifinished

Sheet bars, mill	$67.00*	$67.00*	$67.00*	$60.00
Slabs, Chicago	52.00	52.00	52.00	45.00
Rerolling billets, Pittsburgh	52.00	56.20	59.00	45.00
Wire rod ⅜ to ¼-inch, Pitts. dist.	3.775c	3.775c	3.775c	3.175c

* Nominal. † 1.50 lb coating.

Pig Iron

	Apr. 16, 1949	Mar. 1949	Jan. 1949	Apr. 1948
Bessemer, del. Pittsburgh (N.&S. sides)	$48.08	$48.08	$48.08	$40.996
Basic, Valley	46.00	46.00	46.00	39.00
Basic, eastern, del. Philadelphia	49.39	50.3002	50.2676	42.004
No. 2 fdry., del. Pgh. (N.&S. sides)	47.58	47.58	47.58	40.496
No. 2 fdry., del. Philadelphia	49.89	50.8002	50.7676	42.504
No. 2 foundry, Chicago	46.25	46.25	46.25	39.00
No. 2 foundry, Valley	46.50	46.50	46.50	39.50
Southern No. 2 Birmingham	43.38	43.38	43.38	37.88
Southern No. 2 del. Cincinnati	49.43	49.43	49.09	41.857
Malleable, Valley	46.50	46.50	46.50	39.50
Malleable, Chicago	46.50	46.50	46.50	39.50
Charcoal, low phos., fob Lyles, Tenn.	66.00	66.00	66.00	55.00
Ferromanganese, f.o.b. Etna, Pa.	175.00	170.20	163.00	151.00*

* F.o.b. cars Pittsburgh.

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$25.00	$37.00	$41.90	$40.25
Heavy melt. steel, No. 2, E. Pa.	21.50	30.70	40.00	39.00
Heavy melt. steel, No. 1, Chicago	24.00	33.30	40.00	39.00
Heavy melt. steel, No. 1, Valley	23.00	35.85	39.75	40.25
Heavy melt. steel, No. 1, Cleveland	21.00	34.10	45.88	39.75
Heavy melt. steel, No. 1, Buffalo	24.75	35.95	45.88	43.00
Rails for rerolling, Chicago	32.50	43.85	59.38	49.50
No. 1 cast, Chicago	25.50	39.20	58.38	68.40

Coke

Connellsville, beehive furnace	$14.50	$14.50	$14.50	$12.55
Connellsville, beehive foundry	17.00	17.00	17.00	14.875
Chicago, oven foundry, ovens	20.40	20.40	20.40	19.25

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $80-$85 per gross ton. Forging quality, $50 per net ton, mill.

Alloy Steel Ingots: $51 per net ton, mill.

Rerolling Billets, Blooms, Slabs: $52 per net ton, mill, except: $57, Conshohocken, Pa.

Forging Quality Billets, Blooms, Slabs: $61 per net ton, mill, except: $68, Conshohocken, Pa., mill.

Alloy Billets, Slabs, Blooms: Rerolling quality, $63 per net ton, mill except: $65, Consohocken, Pa.

Sheet Bars: $67 nom., per net ton, mill; sales in open market $90 per gross ton.

Skelp: 3.25c per lb, mill.

Tube Rounds: $76 per net ton, mill; some sellers quoting up to $120 per gross ton.

Wire Rods: Basic and acid open-hearth, 7/32 & ⅜-inch, inclusive, 3.40c per lb, mill, except: 3.65c, Struthers, O.; 3.70c, Worcester, Mass.; 4.05c, Pittsburg, Calif.; 4.10c, Portsmouth, O., Los Angeles; 4.15c Monessen, Pa. Basic open-hearth and bessemer, not resulphurized, 7/32 to 47/64-inch, inclusive, 3.50c, mill.

Bars

Hot-Rolled Carbon Bars (O.H. only; base 20 tons): 3.35c, mill, except: 3.55c, Ecorse, Mich.; 4.00c Fontana, Calif.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, S. San Francisco, Los Angeles, Niles, Calif.; Portland, Oreg., Seattle; 4.20c, Kansas City, Mo.; 4.25c, Minnequa, Colo.; 4.40c, Atlanta.

Rail Steel Bars: (Base 10 tons): 3.35c Huntington, W. Va., and Moline, Ill.; 4.75c, Williamsport, Pa.

Hot-Rolled Alloy Bars: 3.75c, mill, except: 4.05c, Ecorse, Mich.; 4.80c, Los Angeles; 4.75c, Fontana, Calif.

Cold-Finished Carbon Bars (Base 40,000 lb and over): 4.00c, mill, except: 3.95c, Pittsburgh, Cumberland, Md.; 4.20c, Indianapolis; 4.30c, Ecorse, Mich.; 4.35c, St. Louis; 4.36c, Plymouth, Mich.; 4.40c, Newark, N. J., Hartford, Putnam, Conn., Mansfield, Readville, Mass.; 4.50c, Camden, N. J.; 5.30c, Los Angeles.

Cold-Finished Alloy Bars: 4.65c, mill, except: 4.85c, Indianapolis; 4.95c, Worcester, Mansfield, Mass., Hartford, Conn.

High-Strength, Low-Alloy Bars: 5.10c, mill, except: 5.30c, Struthers, O.; 5.40c, Ecorse, Mich.

Reinforcing Bars (New Billet): 3.35c, mill, except: 4.05c, Pittsburg, Torrance, Calif.; 4.10c, Atlanta, Seattle, S. San Francisco, Los Angeles; 4.25c, Minnequa, Colo. Fabricated: To consumers: 4.25c, mill, except: 5.00c, Seattle.

Reinforcing Bars (Rail Steel): 4.65c, Williamsport, Pa., mill; 3.35c, Huntington, W. Va.

Wrought Iron Bars: Single Refined: 8.60c, (hand puddled), McKees Rocks, Pa.; 9.50c, Economy, Pa. Double Refined: 11.25c (hand puddled), McKees Rocks, Pa.; 11.00c, Economy, Pa. Staybolt: 12.75c, (hand puddled), McKees Rocks, Pa.; 11.30c, Economy, Pa.

Sheets

Hot-Rolled Sheets (18 gage and heavier): 3.25c, mill, except: 3.45c, Ecorse, Mich.; 3.75c, Conshohocken, Pa.; 3.95c, Pittsburg, Torrance, Calif.; 4.15c, Fontana, Calif.; 6.25c, Kansas City, Mo.

Hot-Rolled Sheets (19 gage and lighter, annealed): 4.15c, mill, except: 4.40c, Alabama City, Ala.; 4.65c, Niles, O.; 5.05c, Torrance, Calif., Kokomo, Ind.

Cold-Rolled Sheets: 4.00c, mill, except: 4.20c, Ecorse, Mich., Granite City, Ill.; 4.95c, Pittsburg, Calif.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) 4.40c, mill, except: 5.00c, Niles, O.; 5.15c, Pittsburg, Torrance, Calif.; 5.30c, Kokomo, Ind.

Galvannealed Sheets: 4.95c, mill, except: 5.05c, Indiana Harbor, Ind.; 5.55c, Niles, O.; 5.70c, Kokomo, Ind.

Culvert Sheets, No. 16 flat Copper Steel (based on 5-cent zinc): 5.00c, mill, except: 5.40c, Granite City, Ill.; 5.45c, Kokomo, Ind.; 5.75c, Pittsburg, Torrance, Calif.

Long Ternes, No. 10 (Commercial quality): 4.80c, mill.

Enameling Sheets, No. 12: 4.40c, mill, except: 4.60c, Granite City, Ill.; 4.70c, Ecorse, Mich.; 6.00c, Niles, O.

Silicon Sheets, No. 24: Field: 5.15c, mill. Armature: 5.45c, mill, except: 5.95c, Warren, O.; 6.05c, Niles, O.
Electrical: Hot-rolled, 5.95c, mill, except: 6.05c, Kokomo, Ind.; 6.15c, Granite City, Ill.; 6.45c, Warren, O.; 6.55c, Niles, O.
Motor: 6.70c mill, except: 6.90c, Granite City, Ill.; 7.20c, Warren, O.
Dynamo: 7.50c, mill, except: 7.70c, Granite City, Ill.
Transformer 72, 8.05c, mill, except: 9.15c, Follansbee, W. Va., Toronto, O.; 10.05c, Brackenridge, Pa.; 65, 8.60c, mill, except: 9.85c, Follansbee, W. Va., Toronto, O.; 10.60c, Brackenridge, Pa.; 58, 9.30c, mill, except: 10.55c, Follansbee, W. Va., Toronto, O.; 11.30c, Brackenridge, Pa.; 52, 10.10c, mill, except: 11.35c, Follansbee, W. Va., Toronto, O.

High-Strength Low-Alloy Sheets: Hot-rolled, 4.95c, mill, except: 5.15c, Youngstown; 5.25c, Ecorse, Mich. Galvanized (No. 10), 6.75c, mill. Cold-rolled, 6.05c, mill, except: 6.25c, Youngstown; 6.35c, Ecorse, Mich.

Strip

Hot-Rolled Strip: 3.25c mill, except: 3.30c, Cleveland, Pittsburgh, Riverdale, Ill.; 3.25-3.35c,* Sharon, Pa.; 3.45c, Ecorse, Mich.; 3.60c, Detroit; 3.65c, Atlanta; 3.70c, West Leechburg, Pa.; 4.00c, Pittsburg, Torrance, Calif.; 4.25c, Seattle, S. San Francisco, Los Angeles; 4.20c, Kansas City, Mo.; 4.30c, Minnequa, Colo.; 4.65c, Fontana, Calif. One company quotes 4.90c, Pittsburgh base.

* Wider than 6-in. and 6-in. and narrower, respectively.

Cold-Rolled Strip (0.25 carbon and less); 4.00c, mill, except 4.00-4.25c, Warren, O.; 4.00-4.50c, Youngstown; 4.20c, Ecorse, Mich.; 4.25c, Riverdale, Ill.; 4.40-4.50c, Detroit; 4.50c, New Haven, Conn., West Leechburg, New Castle, Pa., Boston; 4.75c, Dover, O., New Kensington, Pa.; 4.50-5.00c, Trenton, N. J.; 4.80-5.05c, Wallingford, Conn.; 5.75c, Los Angeles; 5.55c, Fontana, Calif. One company quotes 4.55c, Cleveland or Pittsburgh base, and 4.75c, Worcester, Mass., base; another, 5.00c, Pittsburgh base.

Cold-Finished Spring Steel: 0.26-0.40 C, 4.00c, mill, except: 4.25c, Dover, O., Chicago; 4.30c, Worcester, Mass.; 4.50c, New Castle, Pa., Boston, Youngstown; 4.75c, Wallingford, Conn. Over 0.40 to 0.60 C, 5.50c, mill, except: 5.65c, Chicago; 5.75c, Dover, O.; 5.80c, Worcester, Mass., Wallingford, Conn., Trenton, N. J.; 5.95c, Boston; 6.00c, New Castle, Pa. Over 0.60 to 0.80 C, 6.10c, mill, except: 6.25c, Chicago; 6.35c, Dover, O.; 6.40c, Worcester, Mass., Wallingford, Bristol, Conn., Trenton, N. J.; 6.60c, New Castle, Pa. Over 0.80 to 1.05 C, 8.05c, mill, except: 7.85c, Dover, O.; 8.20c, Chicago; 8.35c, Worcester, Mass., Bristol, Conn., Trenton and Harrison, N. J. Over 1.05 to 1.35 C, 10.35c, mill, except: 10.15c, Dover, O.; 10.30c, Wallingford, Conn.; 10.50c, Chicago; 10.65c, Worcester, Mass., Trenton and Harrison, N. J.

Cold-Rolled Alloy Strip: 9.50c, mill except: 9.80c, Worcester, Mass.

High-Strength, Low-Alloy Strip: Hot-rolled, 4.95c, mill, except: 5.15c, Struthers, O.; 5.25c, Ecorse, Mich., mill. Cold-rolled, 6.05c, mill, except: 6.25c, Youngstown; 6.35c, Ecorse, Mich., mill.

Tin, Terne Plate

Tin Plate: American Coke, per base box of 100 lb, 1.25 lb coating $7.50-$7.70; 1.50 lb coating $7.75-$7.95. Pittsburg, Calif., mill $8.25 and $8.50, respectively, for 1.25 and 1.50 lb coatings.

Electrolytic Tin Plate: Per base box of 100 lb, 0.25 lb tin, $6.45-$6.65; 0.50 lb tin, $6.70-$6.90; 0.75 lb tin, $7.00-$7.20.

Can Making Black Plate: Per base box of 100 lb, 55 to 128 lb basis weight $5.75-$5.85. Pittsburg, Calif., mill, $6.50.

Hollowware Enameling Black Plate: 29-gage, 5.30c per pound, except: 5.40c, Sparrows Point, Md.; 5.50c, Granite City, Ill.

Manufacturing Ternes (Special Coated): Per base box of 100 lb, $6.65, except: $6.75 Fairfield, Ala., Sparrows Point, Md.

Roofing Ternes: Per package 112 sheets; 20 x 28 in., coating I.C. 8-lb, $15.50.

Plates

Carbon Steel Plates: 3.40c, mill, except: 3.40-3.60c, Cleveland; 3.45c, Sparrows Point, Md., Johnstown, Pa., Lackawanna, N. Y.; 3.55c, Conshohocken, Pa.; 3.60c, Pittsburgh; 3.65c, Claymont, Del., Ecorse, Mich.; 3.75c, Coatesville, Pa.; 4.30c, Seattle, Minnequa, Colo.; 4.56c, Houston; 5.30c, Fontana, Calif.; 4.95c, Harrisburg, Pa.; 6.25c, Kansas City, Mo.

Floor Plates: 4.55c, mill.

Open-Hearth Alloy Plates: 4.40c, mill, except: 5.10c, Coatesville, Pa., mill.

High-Strength, Low-Alloy Plates: 5.20c mill, except: 5.10c, Coatesville, Pa.; 5.30c, Conshohocken, Pa., Sparrows Point, Md., Johnstown, Pa.; 5.40c, Youngstown; 5.65c, Ecorse, Mich., Sharon, Pa.

Shapes

Structural Shapes: 3.25c, mill, except: 3.30c, Bethlehem, Johnstown, Pa., Lackawanna, N. Y.; 3.75c, Phoenixville, Pa.; 3.85c, Torrance, Calif.; 4.15c, Minnequa, Colo.; 4.30c, Seattle, S. San Francisco, Los Angeles; 3.80c, Fontana, Calif.

Alloy Structural Shapes: 4.05c, mill.

Steel Sheet Piling: 4.05c, mill.

High-Strength, Low-Alloy Shapes: 4.95c, mill, except: 5.05c, Bethlehem, Johnstown, Pa., Lackawanna, N. Y.; 5.15c, Struthers, O.

Wire and Wire Products

Wire to Manufacturers (carloads): Bright, Basic or Bessemer Wire, 4.15c, mill, except: 4.25c, Sparrows Point, Md., Kokomo, Ind.; 4.45c, Worcester, Mass.; 4.50c, Minnequa, Colo., Atlanta, Buffalo; 4.80c, Palmer, Mass.; 5.10c, Pittsburg, Calif.; 5.15c, S. San Francisco. One producer quotes 4.15c, Chicago base; another, 4.50c, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Basic MB Spring Wire, 5.55c, mill, except: 5.65c, Sparrows Point, Md.; 5.85c, Worcester, Palmer, Mass., Trenton, N. J.; 6.50c, Pittsburg, Calif.

Upholstery Spring Wire, 5.20c mill, except: 5.30c, Sparrows Point, Md., Williamsport, Pa., Portsmouth, O.; 5.50c, Worcester, Mass., Trenton, N. J., New Haven, Conn.; 6.15c, Pittsburg, Calif.

Wire Products to Trade (carloads): Merchant Quality Wire: Annealed (6 to 8 Gage base), 4.80c, mill, except: 4.90c, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 5.10c Worcester, Mass.; 5.15c, Minnequa, Colo.; 5.20c, Atlanta; 5.75c, S. San Francisco, Pittsburg, Calif. One producer quotes 4.80c, Chicago and Pittsburgh base; another, 5.20c. Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Galvanized (6 to 8 Gage base), 5.25c, mill, except: 5.35c, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 5.40c, Aliquippa; 5.55c, Worcester, Mass.; 5.60c, Minnequa, Colo.; 5.65c, Atlanta; 6.20c, Pittsburg, S. San Francisco, Calif. One producer quotes 5.25c, Pittsburgh and Chicago base; another, 5.65c, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham and Pittsburgh.

Nails and Staples: Standard, cement-coated and galvanized nails and polished and galvanized staples, Col. 103, mill, except: 105, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 109, Worcester, Mass.; 110, Minnequa, Colo., Atlanta, Cleveland; 123, Pittsburg, Calif. One producer quotes Col. 103, Chicago and Pittsburgh base; another, Col. 113, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Woven Fence (9 to 15½ Gage, inclusive): Col. 109, mill, except: 111, Portsmouth, O., Kokomo, Ind.; 116, Minnequa, Colo.; 121, Atlanta; 132, Pittsburg, Calif. One producer quotes Col. 109, Pittsburgh and Chicago base; another, Col. 114, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Barbed Wire: Col. 123 mill, except: 125, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 126 Atlanta; 130, Minnequa, Colo.; 143, Pittsburg, Calif.; 145, S. San Francisco. One producer quotes Col. 123, Chicago and Pittsburgh base.

Fence Posts (with clamps): Col. 114, Duluth; 115, Johnstown, Pa.; 116, Moline, Ill.; 122, Minnequa, Colo.; $123.50 per net ton, Williamsport, Pa.

Bale Ties (single loop): Col. 106, mill, except: 108, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 110, Atlanta; 113, Minnequa, Colo.; 130, S. San Francisco, Pittsburg, Calif. One producer quotes Col. 115, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Stainless Steels

(Mill prices, cents per pound)

CHROMIUM NICKEL STEELS

Type No.	Bars, Wire Shapes	Strip, Cold-Rolled	Sheets
301.....	28.50-28.75	30.50-32.00	37.50-40.75
302.....	28.50-28.75	33.00-33.75	37.50-40.75
303.....	31.00-31.50	36.50-39.75	39.50-43.00
304.....	30.00-31.25	35.00-35.75	39.50-43.00
316.....	46.00-48.00	55.00-57.25	53.00-57.25
321.....	34.00-34.75	44.50-45.75	45.50-49.00
347.....	38.50-39.75	48.50-50.25	50.00-54.00

STRAIGHT CHROMIUM STEELS

410.....	22.75-23.00	26.50-27.00	32.00-33.00
416.....	23.25-23.50	28.25-33.50	32.50-33.50
430.....	23.25-23.50	27.00-27.50	34.75-35.50
446.....	32.50-33.00	60.00-62.25	46.50-50.00

STAINLESS-CLAD STEELS

	Plates —Cladding— 10%	Plates —Cladding— 20%	Sheets —Cladding— 10%	Sheets —Cladding— 20%
302.....	....	....	19.75	21.50
304.....	22.50	26.50	20.75	22.50
310.....	32.50	36.50	....	....
316.....	27.00	31.00	26.00	28.00
321.....	23.50	27.50	....	....
347.....	25.00	29.00	24.00	26.00
405.....	18.75	24.75	....	....
410.....	18.25	24.25	....	....
430.....	18.25	24.25	....	....

Tool Steels

Tool Steel: Cents per pound, producing plants; reg. carbon 19.00c; extra carbon 22.00c; special carbon 26.50c; oil-hardening 29.00c; high carbon-chromium 52.00c; chrome hot work, 29.00c.

W	Cr	V	Mo	Co	Base Per lb
18	4	1	...	...	90.50c
18	4	2	...	...	102.50c
18	4	3	...	...	114.50c
18	4	2	...	9	168.50c
1.5	4	1	8.5	...	65.00c
6.4	4.5	1.9	5	...	69.50c
6	4	3	6	...	88.00c

Tubular Goods

Standard Steel Pipe: Mill prices in carlots, threaded and coupled, to consumers about $200 a net ton. Discounts from base follow:

In.	Butt Weld Blk.	Butt Weld Gal.	In.	Butt Weld Blk.	Butt Weld Gal.
⅛.....	39½– 41½	10– 14	1.....	46– 48½	26½– 29
¼.....	37½– 39½	11– 15½	1¼....	46½– 49	27– 29½
⅜.....	34– 36	6– 10½	1½....	47– 49½	27½– 30
½.....	40½– 43	19½– 23	2.....	47½– 50	28– 30½
¾.....	43½– 46	23½– 26	2½, 3..	48– 50½	28½– 31
			3½ & 4,	44½	24

In.	Lap Weld Blk.	Lap Weld Gal.	Elec. Weld Blk.	Elec. Weld Gal.	Seamless Blk.	Seamless Gal.
2....	39½	19	38½	16½	27– 38½–	6½– 18½
2½..	42½– 43½	22– 23	41½	19½	32½– 41½	12– 21½
3....	42½– 43½	22– 23	41½	19½	35– 41½	14½– 21½
3½&4	42½– 46½	22– 26	43½	21½	38½– 43½	18– 23½
5 & 6.	42½– 44½	22– 24	43½	21½	38½– 43½	18– 23½
7....	....	....	....	....	43½	22

Line Steel Pipe: Mill prices in carlots to consumers about $200 a net ton.

In.	Butt Weld Blk.	Butt Weld Gal.	In.	Butt Weld Blk.	Butt Weld Gal.
⅛.....	40½	....	1¼....	46– 48	27½– 28½
¼.....	38½	....			
⅜.....	35	....	1½....	46½– 48½	28– 29
½.....	40– 42	20– 21	2.....	47– 49	28– 29½
¾.....	43– 45	24– 25	2½ & 3	47½– 49½	28½– 30
1.....	45½– 47½	27– 28	3½ & 4	43½	....

In.	Lap Weld Blk.	Lap Weld Gal.	Elec. Weld Blk.	Elec. Weld Gal.	Seamless Blk.	Seamless Gal.
2....	38½	18	37½	15½	26– 37½	5½– 18
2½..	42½	22	40½	19½	31½– 40½	11– 20½

Standard Wrought Iron Pipe: Mill price in carlots, threaded and coupled, to consumers about $200 a net ton.

In.	Butt Weld Blk.	Butt Weld Gal.	In.	Lap Weld Blk.	Lap Weld Gal.
⅛...	+59½	+93	1¼..	+22	+50½
¼...	+20½	+50	1½..	+15½	+43
⅜...	+10½	+39	2....	+ 7½	+34
1 and 1¼	+ 4½	+30	2½-3½	+ 5	+29½
1½..	— 1½	+26½	4....	List	+23½
2....	— 2	+26	4½-8	+ 2	+25
			9-12.	+12	+34½

Bolts, Nuts

Prices to consumers, f.o.b. midwestern plants. Sellers reserve right to meet competitors' prices, if lower. Additional discounts on carriage and machine bolts, 5 for carloads; 15 for full containers, except tire and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length	35 off
⅝ and ⅝ x 6-in. and shorter	37 off
¾-in. and larger x 6-in. and shorter	34 off
All diameters longer than 6-in.	30 off
Tire bolts	25 off
Plow bolts	47 off
Lag bolts, 6 in. and shorter	37 off
Lag bolts, longer than 6 in.	35 off

Stove Bolts

in packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

	A.S. A. Light	A.S. Reg. and Heavy
Semifinished hexagon	41 off	.....
⅞-in. and smaller	.....	38 off
½-in.-1-in.	39 off	.....
⅞-in.-1-in.	.....	37 off
1⅛-in.-1½-in.	37 off	35 off
1⅝-in. and larger	34 off	28 off

Additional discount of 15 for full containers.

Hexagon Cap Screws (Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	46 off
Upset (1035 heat treated)	
⅝ and smaller x 6 and shorter	40 off
¾, ⅞, & 1 x 6-in. and shorter	35 off

Square Head Set Screws

Upset 1-in. and smaller	51 off
Headless, ¼-in. and larger	31 off

Rivets

F.o.b. midwestern plants

Structural ½-in. and larger	6.75c
⅞-in. and under	48 off

Washers, Wrought

F.o.b. shipping point, to jobbers..Net to $1 off

UNIVERSITY OF MICHIGAN LIBRARIES

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., furnace	$48.00	$48.50	$49.00	$49.50
Newark, N. J., del.	50.5334	51.0334	51.5334	52.0334
Brooklyn, N. Y., del.	....	52.634	53.134	....
Birmingham, furnace	42.88	43.38	....	....
Cincinnati, del.	....	49.43	....	....
Buffalo, furnace	47.00	47.00	47.50	48.00
Boston, del.	56.20	56.20	56.70	....
Rochester, del.	49.35	49.35	49.85	50.35
Syracuse, del.	50.2065	50.2065	50.7065	41.2065
§**Chicago,** district furnaces	46.00	46.00-46.50	46.50	47.00
Milwaukee, del.	47.82	47.82-48.32	48.32	48.82
Muskegon, Mich., del.	....	51.28-51.78	51.78	....
Cleveland, furnace	46.00	46.50	46.50	47.00
Akron, del.	48.3002	48.8002	48.8002	49.3002
Lone Star, Tex., furnace	46.00	†46.50	....	....
Gulf ports, del.	50.50	51.00	....	....
Duluth, furnace	....	46.50	46.50	47.00
Erie, Pa., furnace	46.00	46.50	46.50	47.00
Everett, Mass., furnace	....	52.50	53.00	....
Geneva, Utah, furnace	46.00	46.50	....	....
Seattle, Tacoma, Wash., del.	....	54.0578	....	....
Portland, Oreg., del.	....	54.0578	....	....
Los Angeles, San Francisco	53.5578	54.0578	....	....
Granite City, Ill., furnace	47.90	48.40	48.90	....
St. Louis, del.	49.40	49.90	50.40	....
Ironton, Utah, furnace	47.00	47.50	....	....
‡**Neville Island, Pa.,** furnace	46.00	46.50	46.50	47.00
Pittsburgh, del., N.&S. Sides	47.08	47.58	47.58	48.08
Pittsburgh (Carnegie), furnaces	46.00	....	....	47.00
Sharpsville, Pa., furnace	46.00	46.50	46.50	47.00
Steelton, Pa., furnace	48.00	48.50	49.00	49.50
Struthers, O., furnace	46.00	....	....	....
Swedeland, Pa., furnace	48.00	48.50	49.00	49.50
Philadelphia, del.	49.39	49.89	50.39	50.89
Toledo, O., furnace	46.00	46.50	46.50	47.00
Cincinnati, del.	50.8230	51.3230	....	....
Youngstown, O., furnace	46.00	46.50	46.50	47.00
Mansfield, O., del.	50.1022	50.6022	50.6022	51.1022

† Low phosphorus southern grade.

‡ To Neville Island base add: $0.86 for McKees Rocks, Pa.; $1.31 Lawrenceville, Homestead, McKeesport, Monaca; $1.73 Verona; $1.94 Brackenridge; $1.08 for Ambridge and Aliquippa.

§ Includes, in addition to Chicago, South Chicago, Ill., East Chicago, Gary and Indiana Harbor, Ind.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent Si (base) .$59.50
6.51-7.00.. 60.75 9.01- 9.50. 67.00
7.01-7.50.. 62.00 9.51-10.00. 68.25
7.51-8.00.. 63.25 10.01-10.50. 69.50
8.01-8.50.. 64.50 10.51-11.00. 70.75
8.51-9.00.. 65.75 11.01-11.50. 72.00

F.o.b. Jackson, O., per gross ton. Buffalo furnace $1.25 higher.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron Si 14.01-14.50%, $78.50 furnace. Niagara Falls; $84 open-hearth and $85 foundry grade, Keokuk, Iowa. Piglets, Si 16%, $91, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 a ton for 0.45% max. P.

Charcoal Pig Iron

Semi-cold blast, low phosphours. F.o.b. furnace, Lyles, Tenn....$66 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Low Phosphorus

Steelton, Pa., Troy, N. Y., $54; Philadelphia, $56.9786 del. Intermediate phosphorus, Central furnace, Cleveland, $51.

Electrodes

(Threaded, with nipples, unboxed)

Inches Diam.	Length	Cents per lb f.o.b. plant
	Graphite	
17, 18, 20	60, 72	16.00
8 to 16	48, 60, 72	16.50
7	48, 60	17.75
8	48, 60	19.00
4, 5⅛	40	19.50
3	40	20.50
2½	24, 30	21.00
2	24, 30	23.00
	Carbon	
40	100, 110	7.50
35	100, 110	7.50
30	84, 110	7.50
24	72 to 104	7.50
17 to 20	84, 90	7.50
14	60, 72	8.00
10, 12	60	8.25
8	60	8.50

Fluorspar

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.

Metallurgical Coke

Price per Net Ton

Beehive Ovens	
Connellsville, furnace..	$13.50-15.50
Connellsville, foundry..	16.00-18.00
New River, foundry	16.50
Wise county, foundry..	15.35
Wise county, furnace..	14.60
Oven Foundry Coke	
Kearney, N. J., ovens	$22.00
Everett, Mass., ovens	
New England, del.‡	23.35
Chicago, ovens	20.40
Chicago, del.	†21.85
Detroit, del.	24.16
Terre Haute, ovens	20.20
Milwaukee, ovens	21.15
Indianapolis, ovens	20.85
Chicago, del.	24.19
Cincinnati, del.	23.66
Detroit, del.	24.61
Ironton, O., ovens	19.40
Cincinnati, del.	21.63
Painesville, O., ovens	20.90
Buffalo, del.	23.42
Cleveland, del.	22.55
Erie, del.	22.70
Birmingham, ovens	17.70
Philadelphia, ovens	21.05
Swedeland, Pa., ovens	21.00
Portsmouth, O., ovens	19.50
Detroit, ovens	20.65
Detroit, del.	*21.70
Buffalo, del.	22.75
Flint, del.	22.98
Pontiac, del.	21.98
Saginaw, del.	23.30

Includes representative switching charge of: *, $1.05; †, $1.45. ‡ Or within $4.03 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens (Price effective as of Aug. 5)

Pure benzol	20.00
Toluol, one degree	20.50-26.50
Toluol, two degrees	23.00-26.50
Industrial xylol	20.50-26.50
Per ton bulk, ovens	
Sulphate of ammonia	$45.00
Per pound, ovens (Effective as of Oct. 1)	
Phenol, 40 (carlots, returnable drums)	13.50
Do., less than carlots	14.25
Do., tank cars	12.50
(Effective as of Oct. 25)	
Naphthalene flakes, balls, bbl to jobbers, "household use"	13.75

Refractories

(Prices per 1000 brick, f.o.b. plant)

Fire Clay Brick

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., Ottawa, Ill., $100. Hard-fired, $135 at above points.

High-heat Duty: Salina, Pa., $85; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $80.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., Ottawa, Ill., $66.

Ladle Brick

Dry Press: $55, Freeport, Merill, Station, Clearfield, Pa.; Chester, New Cumberland, W. Va.; Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

Malleable Bung Brick

St. Louis, Mo., Olive Hill, Ky., Ottawa, Ill., $90; Beach Creek, Pa., $80.

Silica Brick

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $80; Hays, Pa., $85; Joliet or Rockdale, Ill., E. Chicago, Ind., $89; Lehi, Utah, Los Angeles, $95.

Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul, Pa., Birmingham, $80.

Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $81.

Basic Brick

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

Magnesite

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; Bulk, $30.50-31.00; single paper bags, $35.00-35.50.

Dolomite

(Base prices per net ton)

Domestic, dead-burned bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibonsburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (natural) Lower Lake Ports

(Any increase or decrease in R.R. freight rates, dock handling charges and taxes thereon effective after Dec. 31, 1948, are for buyer's account.)

Old range bessemer	$7.60
Old range nonbessemer	7.45
Mesabi bessemer	7.35
Mesabi nonbessemer	7.20
High phosphorus	7.20

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62% concentrates, contract 16.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68% .. 17.00
Brazil iron ore, 68-69% 19.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid ..... $26–$28

Manganese Ore

Long term contracts, involving large tonnages, prices are nominal; nearby, 48%, duty paid, 81.8c-83.8c per long ton unit, c.i.f. United States ports; prices on lower grades adjusted to manganese content and impurities.

Chrome Ore

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S.C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	37.50
48% 3:1	39.00
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$25.50-$26.00
45% no ratio	26.50
48% no ratio	29.00-30.00
50% no ratio	29.50-30.50

Brazilian—nominal

44% 2.5:1 lump	$33.65

Rhodesian

45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00

Domestic (seller's nearest rail)

48% 3:1	$39.00

Molybdenum

Sulphide conc., lb, Mo., cont., Mines $0.90

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS			STRIP		BARS				PLATES	
	H-R 10 Ga.	C-R 17 Ga.	Gal. *10 Ga.	†H-R	‡C-R	H-R Rds. ⅜" to 3"	C-F Rds. ½" & up	H-R Alloy **4140	Standard Structural Shapes	Carbon ¾"-¾"	Floor ¾" & Thicker
New York (city)	6.00	6.66	7.40	5.92	...	5.77	6.56	8.68	5.53	5.90	7.36
New York(c'try)	5.80	6.46	7.20	5.72	...	5.57	6.36	8.48	5.33	5.70	7.16
Boston (city) ..	6.10	6.70	8.00	6.10	...	5.67	6.42	8.72	5.57	5.95	7.40
Boston (c'try)..	5.95	6.55	7.85	5.95	...	5.52	6.27	8.57	5.42	5.80	7.25
Phila. (city)...	5.72	6.64	7.43	5.60	...	5.55	6.34	8.40	5.25	5.53	6.74
Phila. (c'try)...	5.57	6.59	7.28	5.45	...	5.40	6.19	8.25	5.10	5.38	6.59
Balt. (city) ...	5.46†	6.36	7.26	5.52	...	5.57	6.31	...	5.51	5.71	7.16
Balt. (c'try)...	5.31†	6.21	7.11	5.37	...	5.42	6.16	...	5.36	5.56	7.01
Norfolk, Va. ..	5.80	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
Wash. (w'hse) .	5.84-6.00	...	...	5.90	...	5.91-5.95	6.61	...	5.85-5.89	6.05-6.09	7.50-7.54
Buffalo (del.)..	5.00	6.05	7.85	5.49	6.50	5.20	6.05	10.13	5.25	5.50	7.06
Buffalo (w'hse)	4.85	5.90	7.70	5.34	6.35	5.05	5.90	9.98	5.10	5.35	6.91
Pitts. (w'hse)..	4.90§	5.75[8]	7.05	5.10	6.00	4.90	5.65	9.60	4.90	5.05-5.10	6.55
Detroit (w'hse).	4.85-5.00§	5.75-5.85[8]	7.15	5.00-5.35	5.95-6.00	5.45	6.17	8.12	5.45	5.65-5.80	7.10
Cleveland (del.)	5.13-5.90†‡	5.90-6.31	6.90-8.10†‡	5.18-5.31	6.40-6.65	5.32-5.36	6.05	8.24-8.40	5.35-5.62	5.52-5.56	6.95-7.01
Cleve. (w'hse).	4.98-5.75	5.75-6.16	6.75-7.95	5.03-5.16	6.25-6.50	5.17-5.21	5.90	8.24-8.25	5.21-5.47	5.37-5.41	6.80-6.86
Cincin. (w'hse).	5.29	6.14	7.63	5.55	6.10	5.55	6.10	...	5.40	5.64	6.94
Chicago (city).	5.20	5.90[8]‡	7.20	5.00	6.67-6.83	5.05	5.85	8.25[9]	5.05	5.25	6.70
Chicago (w'hse)	4.85-5.05	5.75[8]‡	7.05	4.85	6.52-6.68	4.90	5.70	8.10[9]	4.90	5.10	6.55
Milwaukee(city)	5.38	6.08[8]‡	7.38	5.18	6.82-7.01	5.23	6.03	8.43[9]	5.23	5.43	6.88
St. Louis (del.)	5.34§	6.24[8]	7.44	5.34	6.64	5.39	6.19[12]	6.64	5.39	5.59	7.04
St. L. (w'hse).	5.19§	6.09[8]	7.29	5.19	6.49	5.24	6.04[12]	9.49	5.24	5.44	6.89
Birm'ham (city)	5.20§	...	6.60	5.20	...	5.15	6.66-6.83	...	5.15	5.40	7.41-7.73[20]
Birm'ham(c'try)	5.05§	...	6.45	5.05	...	5.00	6.51-6.68	...	5.00	5.25	7.26-7.58[20]
Omaha, Nebr...	6.10-6.35	...	10.04	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	6.60§	8.05	8.20†	6.80	9.50	6.25	8.20	...	6.10	6.30	8.20
L. A. (w'hse) .	6.45§	7.90	8.05†	6.65	9.35	6.10	8.05	...	5.95	6.15	8.05
San Francisco..	6.15[21]	7.50	8.10	6.75[21]	8.25[18]	5.90[21]	7.55	10.85[2]	5.90	6.35	8.10
Seattle-Tacoma.	6.35[17]	7.90[5]	8.25	6.70[17]	...	6.20[17]	8.15[1]	9.45[2]	6.30[17]	6.35[17]	8.40[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [2]—1000 to 4999 lb; [5]—450 to 1499 lb; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [12]—1000 lb and over; [17]—300 to 999 lb; [18]—1500 to 1999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § 18 gage and heavier; ** as rolled; †† add 0.40 for sizes not rolled in Birmingham; ‡‡ top level of quoted range is nominal.

PRICES OF LEADING FERROALLOY PRODUCTS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, c.l., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base Price: $165, Rockwood, Tenn.; $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $163, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P. 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c, Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17.5%, deduct 0.2c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots, 2" x D, $1.40 per lb of contained Ti; less ton $1.45, (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.). Ton lot $1.28, less ton $1.35. F.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract, $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%). Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

VANADIUM ALLOYS

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max). Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.), $3.10.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb of contained V_2O_5, freight allowed. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c, freight allowed.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $6.25 per lb contained B, f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅜ lb each and containing exactly 2 lb of Cr.). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk, 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si; packed 19.90-21.70c; ton lots 21.00-22.60c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload

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UNIVERSITY OF MICHIGAN LIBRARIES

Copper and Zinc Prices Decline

Electrolytic copper offered by custom smelter at 21.50c, off 1.75 cents per pound. Prime western zinc drops 1-cent a pound to 14.00c, East St. Louis. Buying remains light

New York—After holding steady earlier in the week, weakness developed in nonferrous metal markets last Thursday. A custom smelter offered electrolytic copper at 21.50c, delivered Connecticut Valley, while prime western zinc dropped 1-cent to 14.00c, East St. Louis.

Copper—Although electrolytic copper had been available in the custom-smelter market for three weeks at 23.25c, delivered Connecticut Valley, buying had remained at a disappointingly low level. Mine producers continue to maintain their 23.50-cent level.

Deliveries of refined copper by primary producers increased 15,361 tons during March to 113,972 tons from 98,611 tons in February, according to statistics issued last week by the Copper Institute. This compared with deliveries of 122,988 tons in March, 1948.

Production of crude copper increased 19,144 tons during March to a total of 96,085 tons, of which 78,355 tons were accounted for by primary sources and 17,730 tons by smelters of scrap. In March, 1948, output totaled 83,909 tons.

Production of refined copper totaled 88,165 tons in March, resulting in a decline in stocks of 13,159 tons to a total of 70,682 tons, the lowest level attained during the last 12 months.

Lead—Buying interest in the domestic lead market improved slightly last week, but consumers were still confining the bulk of their orders for prompt shipment at the 14.80 to 14.85-cent level. On forward bookings, most business was transacted on an average price basis or on basis of "price at time of shipment."

Imports of refined lead totaled 22,009 tons in February compared with 23,291 tons in January, according to the American Bureau of Metal Statistics. Included in the February imports were: 9610 tons from Mexico, against 8251 tons in January; 2775 tons from Canada against 6147; 6942 tons from Australia against only 113 tons in January. Imports from Italy dropped to 641 tons from 2724 tons while those from Burma dropped to 350 tons from 1008 tons in January.

Zinc—Despite the drop of slab zinc prices to the basis of 14.00c, East St. Louis, for prime western from 17.50c in mid-March, new bookings continue extremely light. On the basis of business booked so far, domestic deliveries in April will drop below the comparatively light deliveries of 51,381 tons in March. During April of last year deliveries amounted to 64,801 tons. Earlier in the year it had been believed that government buying for stockpiling would bolster the market whenever industrial buying declined. However, this support has been weakened by the announcement that the government's purchases of the permanent stockpile for the fiscal year ending June 30 have been reduced from an original proposal of 111,000 tons to 74,000 tons.

Smelter production of zinc increased about 9000 tons in March to a total of 78,121 tons while shipments to domestic consumers declined about 9500 tons to a total of 51,281 tons. This latter figure is the smallest recorded since September, 1947. Exports, however, increased to 7460 tons from 3497 in February. During March, 12,176 tons of zinc were smelted on government account against only 4198 tons in the preceding month. Additions to the stockpile so far this year have amounted to 24,137 tons, making a grand total of about 289,000 tons.

Stocks of zinc in the hands of smelters at the end of March totaled 28,204 tons, representing an increase of about 7100 tons. Unfilled orders on the books of smelters totaled 79,722 tons as of Mar. 31 compared with 87,898 tons as of Feb. 28.

Tin—Recent reaction which swept through the major nonferrous metal markets did not affect tin since it is still a "controlled" market. However, some users are known to have curtailed consumption. No change in the government's selling price is expected before midyear.

Exports of tin concentrates from Bolivia dropped to the equivalent of only 1989 tons of fine tin during February, the smallest volume in over two years. This compared with 2500 tons in January and 4486 tons in December, 1948.

Aluminum — Buying interest increased in the secondary aluminum market last week, following the recent reduction in prices. The market is now quoted at the following levels: Piston alloys (6-6 type), 17.50c; No. 12 aluminum (No. 2 grade), 17.00c; steel deoxidizing grade 1, 18.00c.

Production of primary aluminum eased to 49,749 tons in February from 53,357 tons in January and compared with 55,450 tons in May, 1948, the postwar high.

Wrought Metal Shipments

Washington — Shipments of magnesium wrought products during February totaled 636 thousand pounds, 9 per cent above the 581 thousand pounds shipped in January, and 54 per cent higher than the 413 thousand pounds shipped in February, according to the Bureau of the Census, Department of Commerce.

Shipments of aluminum wrought products, continuing the downward trend which started in November 1948, totaled 110 million pounds in February, lower than for any month since August 1947 when shipments amounted to 102 million pounds.

Offers Chromium Oxide Green

St. Paul—Increased supply of chromium oxide green for making metal alloys and for coloring paints, inks, ceramics and glass, was offered Apr. 9 by Minnesota Mining & Mfg. Co., this city. The company can supply "almost unlimited quantities" of the powder (Cr_2O_3) each month. The firm offers chromium oxide (metallurgical grade) and chromium oxide green. Distribution will be direct from the manufacturer to the user, it was announced.

Both products have a chromic oxide content of more than 98 per cent, with a chromium content of over 67 per cent. Specific gravity is 5.08; oil absorption, 12.0; and fineness measures 0.5 per cent retention on a 325-mesh screen.

Metal Export Quotas Lifted

Washington — Removal of fixed quotas limiting the quantities of a number of types of nonferrous metals, minerals and manufactures that may be exported during the second quarter of 1949 has been announced by the Department of Commerce through its Office of International Trade.

Exporters of these commodities, however, must continue to obtain validated OIT licenses, and to observe all applicable export regulations. In applying for licenses, shippers must certify that they hold accepted orders from foreign consignees, and state the uses to which the products will be put in the countries to which they are exported.

License applications may be submitted to OIT at any time, and will be acted on as they are received.

OIT officials explained that a substantial improvement in the supply of the nonferrous commodities is responsible for the removal of the quota restrictions. The overall supply, however, is not yet adequate to permit removing the commodities from the Positive List. (Commodities not on the Positive List may be exported without validated Licenses to destinations outside the "R Group" countries of Europe and adjacent areas.)

In addition to removal of fixed quotas for these commodities, the quota for lead pigs, bars and anodes (including blocks and ingots) has been increased from 650 tons for the first quarter of 1949 to 1200 tons for the second quarter.

The nonferrous metals, minerals and manufactures for which fixed export quotas have been removed for the second quarter of 1949 and quotas in effect during the first quarter of the year are:

Commodity	1st Qtr. Quota Net Tons
Copper Rods and Bars	500
Brass and Bronze.	
Scrap	5,000*
Pipes and tubes	1,000
Pipe fittings	300
Wire	700
Lead Sheets and Pipes	600
Type Metal and Type, including multigraph	250
Antimonial Lead	200
Foil, Lead and Lead-Tin	5
Lead Plate, or Battery Plate	125
Lead Castings	250
Babbitt Metal	250
Bismuth Matte, Slimes, Residues, base bullion	Closed
Copper alloys in primary forms (Except brass, bronze, nickel or gold)	100
Insulated Copper Wire and Cable:	
Building	1,400
Weatherproof	700
Insulated	4,000

* Tin content not to exceed 5 per cent for any application. † Tin content not to exceed 100 short tons.

NONFERROUS METAL PRICES

(Cents per pound, carlots, except as otherwise noted)

Copper: Electrolytic, 23.25-23.50c, Conn. Valley; Lake, 23.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 18.00-18.50c; 88-10-2 (No. 215) 27.50c; 80-10-10 (No. 305) 23.75c; No. 1 yellow (No. 405) 15.00-16.00c.

Zinc: Prime western 15.00c, brass special 15.25c, intermediate 15.50c, East St. Louis; high grade 16.00c, delivered.

Lead: Common 14.80-14.85c; chemical, 14.90c; corroding 14.90-14.95c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloy (6-6 type) 17.50; No. 12 foundry alloy (No. 2 grade) 17.00; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 18.00c; grade 2, 17.00c; grade 3, 16.00c; grade 4, 15.00c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, 99.8% or higher (including Straits) $1.03; grade B, 99.8% or higher, not meeting specifications for grade A, with 0.05% max. arsenic, $1.028; grade C, 99.65-99.79%, incl., $1.024; 99.5-99.649% $1.024, grade F, 98-98.999% $1.015 for tin content. Prices are ex-dock, New York, in 5-ton lots.

Antimony: American 99-99.8% and over but not meeting specifications below, 38.50c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 39.00c, f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $87-$90 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 71.50c per ounce.

Platinum: $72-$75 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 37.18; yellow brass 33.77; commercial bronze, 95% 37.11; 90%, 36.63; red brass, 85%, 35.64; 80%, 35.17; best quality, 34.64; nickel silver, 18%, 46.42; phosphor-bronze, grade A, 5%, 56.05.

Rods: Copper, hot rolled 33.03; cold drawn 34.28; yellow brass, free cutting, 28.22; commercial bronze, 95% 36.80; 90% 36.32; red brass, 85% 35.33; 80% 34.86.

Seamless Tubing: Copper 37.22; yellow brass 36.78; commercial bronze 90% 39.29; red brass 85% 38.55; 80% 38.08.

Wire: Yellow brass 34.06; commercial bronze, 95% 37.40; 90% 36.92; red brass, 85% 35.93; 80% 35.46; best quality brass 34.93.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 29.42½c, l.c.l. 29.92½-30.05c; weatherproof, f.o.b. eastern mills, c.l. 29.60-29.85c, l.c.l. 30.35c; magnet, delivered, c.l. 32.75-33.50c, 15,000 lb or more 33.00-33.75c, l.c.l. 33.50-34.25c.

ALUMINUM

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-20	36.8	33.4	39.5
0.008-0.0075	12-20	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	——Hexagonal—— R317-T4	17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	37.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $20.00 per cwt.; add 50c per cwt., 10 sq ft to 140 sq ft. Pipe: Full coils, $20.00 per cwt; cut coils, $20.00. Traps and Bends: List price plus 53%.

ZINC

Sheets, 19.00c, f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 18.25c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 17.25c; over 12-in., 18.25c.

NICKEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill.)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c, Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb. 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Mar. Ave.	23.486	18.825	17.056	103.00	17.00	38.50	40.00	71.50
Apr. 1-2..	23.25-23.50	15.85-16.80	16.00	103.00	17.00	38.00	40.00	71.50
Apr. 4 ...	23.25-23.50	15.80-15.85	16.00	103.00	17.00	38.50	40.00	71.50
Apr. 5 ...	23.25-23.50	15.80-15.85	15.00	103.00	17.00	38.50	40.00	71.50
Apr. 6-13.	23.25-23.50	14.80-14.85	15.00	103.00	17.00	38.50	40.00	71.50
Apr. 14 ..	21.50-23.50	14.80-14.85	14.00	103.00	17.00	38.50	40.00	71.50

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9%, flake, f.o.b. Philadelphia, carloads, 26.00c; 5 tons and over 26.50c; 1 to 5 tons, 27.00c; less than 1 ton, 27.50c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 33.84c; oval 33.34; cast, 31.87c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 48.00c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,900 lb, 17.00c, f.o.b. Niagara Falls, N. Y.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 26.25c; over 250 lb, 25.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 10 lb, 64.00c; f.o.b. Cleveland. Add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over 119.00c; 500 to 999 lb, 119.50c; 200 to 499 lb, 120.00c; less than 200 lb, 121.50c; ball, 1000 lb and over, 121.25c; 500 to 999 lb, 121.75c; 200 to 499 lb, 122.25c; less than 200 lb, 123.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 71.8c; 100 or 300 lb drums only, 100 to 500 lb, 63.6c; 600 to 1900 lb, 61.2c; 2000 to 9900 lb, 59.4c. Prices f.o.b Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 42.50c, f.o.b. Cleveland; 43.00c, Detroit; 42.00c, f.o.b. Philadelphia.

Stannous Sulphate: Less than 2000 lb in 100 lb kegs, 100.00c, in 400 lb bbl, 99.00c; more than 2000 lb, in 100 lb kegs, 99.00c, in 400 lb bbl, 98.00c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 97.00c; in 100 lb kegs, 98.00c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.125	21.125	20.375
Yellow brass	18.000	17.750	17.125
Commercial Bronze			
95%	20.000	19.750	19.250
90%	19.875	19.625	19.125
Red Brass			
85%	19.625	19.375	18.875
80%	19.375	19.125	18.625
Best Quality (71-80%)	19.125	18.875	18.375
Muntz Metal	17.250	17.000	16.500
Nickel, silver, 10% ...	19.625	19.375	9.8125
Phos. bronze, A.....	22.625	22.375	21.375
Naval brass	17.750	17.500	17.000
Manganese bronze ...	17.750	17.500	16.875

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, f.o.b. shipping point, carload lots)

No. 1 copper 15.75-16.00, No. 2 copper 14.75-15.00, light copper 13.75-14.00, composition red brass 11.75-12.00, auto radiators 9.25-9.50, heavy yellow brass 8.75-9.25.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 16.00, No. 2 copper 15.00, light copper 14.00, refinery brass (60% copper), per dry copper content 14.00.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 14.75-15.00, No. 2 13.75-14.00, light copper 12.75-13.00, No. 1 composition red brass 9.50-9.75, No. 1 composition turnings 9.00-9.25, mixed brass turnings 7.50-7.75, new brass clippings 12.75-13.00; No. 1 brass rod turnings 9.00-9.25, light brass 6.50-6.75, heavy yellow brass 7.50-7.75, new brass rod ends 10.75-11.25, auto radiators, unsweated 8.75-9.00, cocks and faucets 8.75-9.00, brass pipe 8.75-9.00.

Lead: Heavy 8.00-8.50, battery plates 4.25-4.50, linotype and stereotype 11.50-12.00, electrotype 9.50-10.00, mixed babbitt 11.50-12.00, solder joints, 14.00-14.50.

Zinc: Old zinc 6.50-7.00, new die cast scrap 6.50-7.00, old die cast scrap 4.50-5.00.

Tin: No. 1 pewter 56.00-58.00, block tin pipe 78.00-80.00, No. 1 babbitt 43.00-45.00, siphon tops 47.00-49.00.

Aluminum: Clippings 2S 11.00-11.50, old sheets 7.00-7.50, crankcase 7.00-7.50, borings and turnings 3.50-4.00, pistons, free of struts, 7.00-7.50.

UNIVERSITY OF MICHIGAN LIBRARIES

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt.....	$25.00
No. 2 Heavy Melt.....	23.00
No. 1 Busheling.....	25.00
No. 1 Bundles.....	25.00
No. 2 Bundles.....	21.00-22.00
No. 3 Bundles.....	20.00-21.00
Heavy Turnings	22.00-23.00
Machine Shop Turnings	17.00-18.00‡
Mixed Borings, Turnings	18.00-19.00‡
Short Shovel Turnings.	22.00-23.00‡
Cast Iron Borings.....	18.00-19.00‡
Bar Crops and Plate..	28.50-29.50
Low Phos. Steel.....	28.50-29.50

Cast Iron Grades†

Mixed Yard	32.00-33.00
No. 1 Machinery Cast.	35.00-36.00
Charging Box Cast....	33.00-34.00
Heavy Breakable Cast.	28.00-30.00
Brake Shoe	31.00-33.00

Railroad Scrap†

No. 1 R.R. Heavy Melt.	27.00
Axles	36.00-37.00
Rails, Random Lengths	32.50-33.50
Rails, 2 ft and under.	36.50-37.50
Rails, 18 in. and under	38.50-39.50
Railroad Specialties ...	32.00-33.00
Angles, Splice Bars...	35.00-36.00

* Brokers' buying prices.
† Nominal.
‡ Brokers offering prices.

CLEVELAND

Heavy Melt. Steel.....	$21.00†
No. 1 Busheling.....	21.00†
No. 2 Bundles.....	20.50†
Machine Shop Turnings	14.00†
Mixed Borings, Turnings	18.50-19.00
Short Shovel Turnings.	18.50-19.00
Cast Iron Borings.....	18.50-19.00
Bar Crops and Plate..	26.00†
Punchings & Plate Scrap	26.00†
Cut Structurals	27.50†

Cast Iron Grades†

No. 1 Cupola	34.00-35.00
Charging Box Cast....	32.00-34.00
Stove Plate	30.00-32.00
Heavy Breakable Cast.	26.00-27.00
Unstripped Motor Blocks	26.00-27.00
Malleable	30.00
Brake Shoes	27.00-27.50
Clean Auto Cast.....	37.00-37.50
No. 1 Wheels.....	32.00-33.00
Burnt Cast	25.00-26.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
R.R. Malleable	36.00†
Rails, 3 ft and under.	38.00-40.00
Rails, Random Lengths	32.00-34.00
Cast Steel	33.00
Railroad Specialties ..	33.00
Uncut Tires	32.00
Angles, Splice Bars....	36.00-37.00

† Nominal.

VALLEY

Heavy Melt. Steel	$23.00†
No. 1 Bundles.....	23.00†
No. 2 Bundles.....	22.00†
Machine Shop Turnings	16.00†
Short Shovel Turnings.	21.00†
Cast Iron Borings.....	21.00†
Low Phos.	27.50†

Railroad Scrap

No. 1 R.R. Heavy Melt.	31.00

† Nominal.

MANSFIELD

Machine Shop Turnings	$16.00†
Short Shovel Turnings.	21.00†

† Nominal.

CINCINNATI

No. 1 Heavy Melt. Steel	$21.50
No. 2 Heavy Melt. Steel	20.50
No. 1 Busheling	21.50
Nos. 1 & 2 Bundles ..	19.50
Machine Shop Turnings	11.50
Mixed Borings, Turnings	11.50
Short Shovel Turnings.	11.50
Cast Iron Borings	12.00

Cast Iron Grades

No. 1 Cupola Cast ...	35.00
Charging Box Cast ..	26.00
Heavy Breakable Cast.	24.00
Stove Plate	21.00
Unstripped Motor Blocks	20.00
Brake Shoes	19.00
Clean Auto Cast	35.00
Drop Broken Cast	38.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	24.00
R.R. Malleable	26.00
Rails, Rerolling	32.00
Rails, Random Lengths	30.00
Rails, 18 in. and under	39.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 1 Bundles.....	$20.00-21.00
No. 2 Bundles.....	17.00-18.00
No. 2 Heavy Melt. Steel	18.00-19.00
No. 1 Busheling.....	18.00-19.00
Machine Shop Turnings	11.00-12.00
Mixed Borings, Turnings	12.00-13.00
Short Shovel Turnings.	13.00-14.00
Cast Iron Borings.....	13.00-14.00
Punchings & Plate Scrap	20.00-21.00

Cast Iron Grades

No. 1 Cupola Cast....	24.00-26.00
Heavy Breakable Cast.	19.00-21.00
Clean Auto Cast.....	24.00-26.00

BUFFALO

No. 1 Heavy Melt. Steel	$24.50-25.00
No. 2 Heavy Melt. Steel	21.50-22.00
No. 1 Bundles.....	22.00
No. 2 Bundles	19.50-20.00
No. 1 Bushelings.....	21.50-22.00
Machine Shop Turnings	15.00-16.00
Mixed Borings, Turnings	17.00-18.00
Cast Iron Borings.....	17.00-18.00
Short Shovel Turnings.	18.50-19.00
Low Phos.	26.00-27.00

Cast Iron Grades

Mixed Yard Cast.....	28.00-30.00
Heavy Breakable	27.00-29.00
Malleable	32.00-34.00
Clean Auto Cast.....	33.00-34.00

Railroad Scrap

Rails 3 ft. and under..	38.50-39.00
Scrap Rails	34.50-35.00
Specialties	34.50-35.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$23.00-23.50
No. 2 Heavy Melt. Steel	21.00-21.50
No. 1 Busheling.....	21.00-21.50
No. 1 Bundles.....	23.00-23.50
No. 2 Bundles.....	19.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	14.00
Short Shovel Turnings.	20.00
Bar Crop and Plate...	27.00
Punchings & Plate Scrap	27.00
Cut Structurals	25.00
Elec. Furnace Bundles.	24.00
Heavy Turnings	23.00-24.00
No. 1 Chemical Borings	Nom.

Cast Iron Grades

No. 1 Cupola Cast....	27.00
No. 1 Machinery Cast.	29.00-30.00
Charging Box Cast....	27.00-28.00
Heavy Breakable Cast.	27.00-28.00
Unstripped Motor Blocks	24.50
Clean Auto Cast.....	29.00-30.00
No. 1 Wheels.....	29.00-30.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$18.00
No. 2 Heavy Melt. Steel	14.00-15.00
No. 1 Busheling	14.00-15.00
No. 1 Bundles.....	17.00-18.00
No. 2 Bundles.....	15.00
No. 3 Bundles	nominal
Machine Shop Turnings	5.00-6.00
Mixed Borings, Turnings	5.00-6.00
Short Shovel Turnings.	7.00-8.00
Punchings & Plate Scrap	18.00-19.00
Cut Structurals	nominal
Elec. Furnace Bundles.	18.00-19.00

Cast Iron Grades

No. 1 Cupola Cast....	20.00-21.00
No. 1 Machinery	21.00-22.00
Charging Box Cast....	18.00-18.50
Heavy Breakable	18.00-18.50
Unstripped Motor Blocks	nom.
Malleable	nom.

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$17.00
No. 2 Heavy Melt. Steel	13.50
No. 1 Bundles.....	15.00-15.50
No. 1 Busheling.....	13.50
Machine Shop Turnings	9.00-9.50
Mixed Borings, Turnings	8.00-8.50
Short Shovel Turnings.	11.75-12.00
Bar Crops and Plate..	18.00-19.00
Punchings & Plate Scrap	18.00-19.00
Chemical Borings	25.00-26.00

Cast Iron Grades

No. 1 Cupola Cast.....	25.00-26.00
Mixed Cast	22.00-24.00
Heavy Breakable Cast.	24.00-25.00
Stove Plate	22.00-24.00
Unstripped Motor Blocks	18.00-20.00

CHICAGO

No. 1 Heavy Melt. Steel	$23.00-25.00
No. 2 Heavy Melt. Steel	22.00-23.00
No. 1 Bundles.....	23.00-24.00
No. 2 Bundles.....	19.00-20.00
No. 3 Bundles.....	17.00-18.00
Machine Shop Turnings	12.00-13.00
Mixed Borings, Turnings	13.00-14.00
Short Shovel Turnings.	14.00-15.00
Cast Iron Borings.....	13.00-14.00
Bar Crops and Plate..	26.50-27.50
Punchings	26.50-27.50
Elec. Furnace Bundles.	24.00-25.00
Heavy Turnings	24.00-25.00
Cut Structurals	25.00-26.00

Cast Iron Grades*

No. 1 Cupola Cast....	29.00-30.00
Clean Auto Cast.....	29.00-30.00
No. 1 Wheels.....	29.00-30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	25.00-26.00
Malleable	30.00-31.00*
Rails, Rerolling	32.00-33.00
Rails, Random Lengths	28.00-29.00
Rails, 2 ft. and under.	32.00-33.00
Rails, 18 in. and under	33.00-34.00
Railroad Specialties ..	31.00-32.00
Angles, Splice Bars....	30.00-31.00

* Nominal.

ST. LOUIS

No. 1 Heavy Melt. Steel	$26.00-27.00
No. 2 Heavy Melt. Steel	21.00-22.00
Machine Shop Turnings	15.00-16.00
Short Shovel Turnings.	15.00-16.00

Cast Iron Grades

No. 1 Cupola Cast ..	32.00-33.00
Charging Box Cast	27.00-28.00
Heavy Breakable Cast.	27.00-28.00
Brake Shoes	26.00-27.00
Clean Auto Cast	33.00-35.00
Burnt Cast	27.00-28.00

Railroad Scrap

R.R. Malleable	24.00-25.00
Rails, Rerolling	31.00-32.00
Rails, Random Lengths	26.00-27.00
Rails, 3 ft. and under.	32.00-33.00
Uncut Tires	26.00-27.00
Angles, Splice Bars ..	32.00-33.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	22.00
No. 1 Busheling.....	22.00
No. 2 Bundles.....	20.00
Long Turnings	18.00
Short Shovel Turnings.	19.00
Cast Iron Borings.....	19.00
Bar Crops and Plate..	28.00-29.00
Cut Structurals	25.00-26.00

Cast Iron Grades

No. 1 Cupola Cast....	32.00-34.00
Stove Plate	30.00-32.00
No. 1 Wheels.....	30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	24.00
R.R. Malleable	nominal
Rails, Rerolling	33.00-35.00
Rails, Random Lengths	28.00
Rails, 3 ft. and under.	31.00
Angles and Splice Bars	31.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	20.00
Nos. 1 & 2 Bundles...	18.00
Machine Shop Turnings	12.00

Cast Iron Grades

No. 1 Cupola Cast....	25.00-30.00

Railroad Scrap

No. 1 Heavy Melting..	22.00
Wheels	22.00
Rails, Random Lengths	22.00

SEATTLE

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Busheling	17.50
Nos. 1 & 2 Bundles ..	18.00
No. 3 Bundles.....	nom.
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.00
Punchings & Plate Scrap	30.00
Cut Structurals	30.00

Cast Iron Grades

No. 1 Cupola Cast....	25.00-30.00
Heavy Breakable Cast.	20.00-22.00
Stove Plate	25.00
Unstripped Motor Blocks	20.00
Malleable	25.00
Brake Shoes	25.00
Clean Auto Cast.....	25.00
No. 1 Wheels.....	25.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	22.00
Railroad Malleable ...	22.00
Rails, Random Lengths	22.00
Angles and Splice Bars	22.00

LOS ANGELES

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	20.00
Nos. 1 & 2 Bundles..	18.00
No. 3 Bundles	15.00
Machine Shop Turnings	12.00
Mixed Borings, Turnings	12.50-13.00
Punchings & Plate Scrap	28.00-31.00

Cast Iron Grades

No. 1 Cupola Cast....	$27.00-32.00

HAMILTON, ONT.

(Ceiling prices, delivered)

Heavy Melt.	$23.00
No. 1 Bundles.....	23.00
Mechanical Bundles...	21.00
Mixed Steel Scrap.....	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	23.00
Rails, Rerolling	26.00
Bushelings	17.50
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings..	17.00

Cast Iron Grades*

No. 1 Cast.....	48.00
No. 2 Cast.....	44.00

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.

Sheets, Strip . . .

Sheet Prices, Page 142

Order backlogs continue to decline as production holds at high rate

Boston — Flat-rolled steel order backlogs are being reduced by mills continuing a high level of production. Except in galvanized items, sheet and strip supplies balance demand. Wave of cutbacks is subsiding, although consumers are still concerned as to inventories and are marking time with fill-in specifications pending general business developments. Orders remaining on mill order books are generally firm and wanted. Price revisions are limited to meet competitive situations, although there are still variances in mill prices and delivered costs to users. The price spread is a factor in placing of hot strip orders and, for the first time in months, producers in some instances will not be able to dispose of heavier district offerings.

Contributing to the better supply of cold-rolled strip is the output of Detroit Steel Corp.'s new mill at New Haven, Conn., which will have a rated production of 60,000 tons annually.

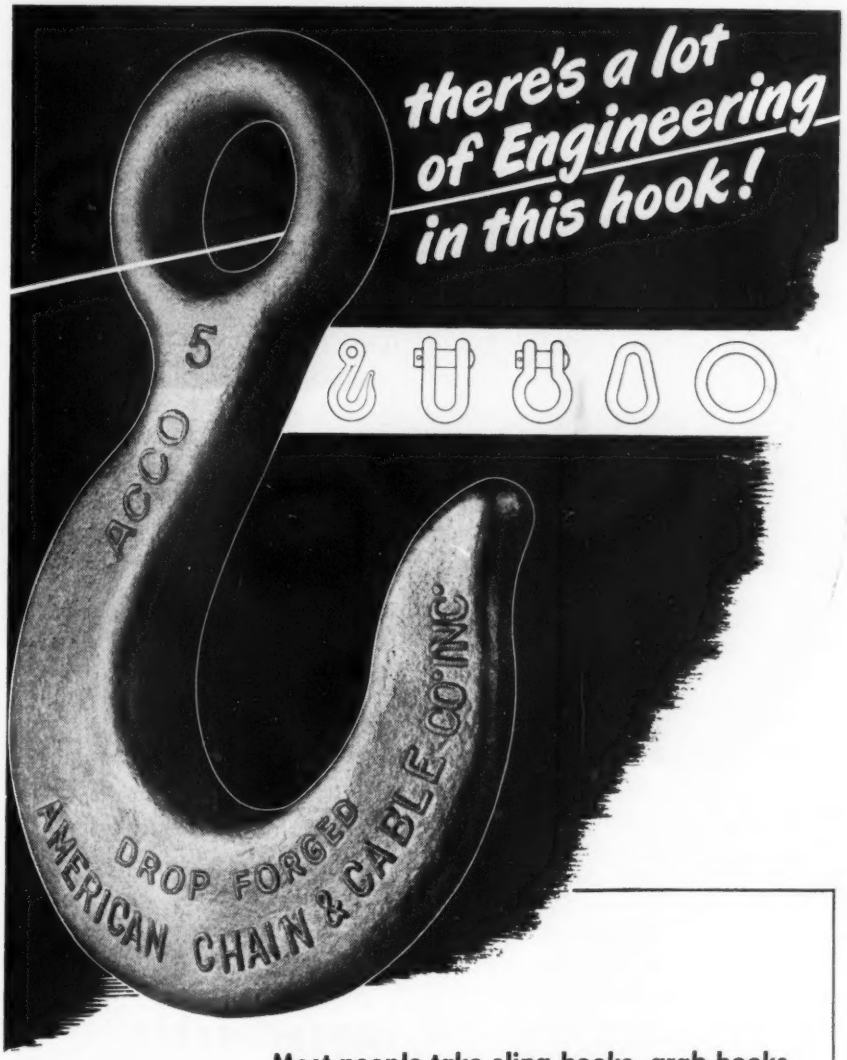
New York—While pressure for sheets is off appreciably, producers are still finding a market for all the major products they can produce at standard prices. They claim it will still be some weeks before there will be a real balance between supply and demand, although they can give delivery on specialties within a few weeks. One middle western producer has just taken the lower grades of silicon sheets off quota.

Imports have fallen off heavily over recent weeks. Foreign sellers have dropped their prices to some extent, but not sufficiently to be competitive with American mills. Meanwhile, some of the foreign tonnage in storage along the eastern seaboard has been offered by importers at prices below domestic levels.

Pittsburgh — Growing competitive situation in sheets is illustrated by action of Jones & Laughlin Steel Corp. in reducing its quotation $1 a ton for hot rolled to level of leading competitors of $3.25 per 100 pounds. However, there has been little if any adjustment in sheet and strip production schedules to date, with exception of lower grade silicon steels. Despite apparent easing in cold-rolled strip demand, the nonintegrated interests report little opposition to premium prices yet has developed, although it is admitted a slight reduction in production schedules has occurred. An increasing number of trade authorities predict mill allotment distribution of sheets and strip will be discontinued by early third quarter.

Philadelphia—Producers of hot and cold-rolled sheets and galvanized sheets, quoting standard prices, are having no difficulty in general in booking tonnage. Production is being maintained at a high rate with no curtailment in immediate prospect. Bookings in specialty products, however, are slow.

Chicago—With the gray market in extreme distress and some of its of-



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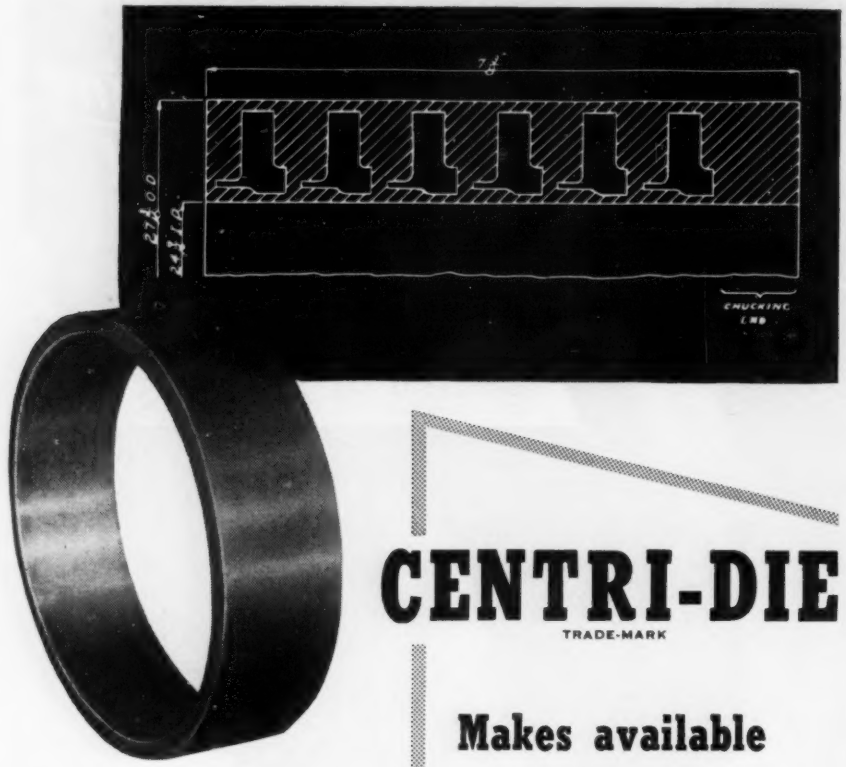

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THE rings shown in the cross sectional diagram above are machined from a cylinder similar to the one shown above. It is cast from one of the new alloys especially adaptable for the extraordinary temperature requirements of jet engines.

The Lebanon CENTRI-DIE process of making centrifugal castings opens the door to the use of many alloys which were impractical or too costly to fabricate by any other method.

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LEBANON *ALLOY AND STEEL* Castings

CIRCLE L

ferings going begging at below mill prices, it seems paradoxical some sheet consumers continue willing to pay the price of conversion. True demand for these arrangements is off, several district electric furnaces previously in ingot production for this purpose now lying idle; but rolling capacity is still sought, one mill reporting that several deals are cooking for third quarter, interested parties being in the automotive industry. Continuation of strong demand for galvanized sheets is indicated by the sheet metal contracting industry, building prospects in their field over the remainder of the year appearing quite favorable, although somewhat under last year's.

Cleveland—Stepped-up production schedules for the next few months in the automobile industry presage a heavy demand from that quarter for hot and cold-rolled carbon sheets, according to a steel producer here. This producer is continuing its monthly tonnage quota system on sheets.

Although stainless sheets are in relatively easy supply, the demand for stainless strip continues strong, largely as a result of requirements of the automotive trade.

Cincinnati—Strong demand still exists for hot and cold-rolled and galvanized sheets with indication that full production by district mills will be sustained. Nevertheless, there is considerable shifting of tonnage due to cutbacks; modification or elimination of allocations is indicated. A start toward this end has been made by mills shifting to the more flexible monthly schedules from quarterly schedules. Inquiries for special sheets are off with supplies easy.

Dallas—While gray market prices have disappeared and supplies are beginning to loosen up, there has been no weakening of the standard price structure.

Los Angeles—Although producers generally are still on an allocation basis, demand continues to ease, and there are recurring instances of offered tonnage being refused by fabricators who have placed their buying on a hand-to-mouth basis. Sheet requirements are lower than anticipated for some of the so-called seasonal consumers, such as air conditioning and cooler manufacturers.

San Francisco — Although flat-rolled products are still far from plentiful, continued easing demand and slowly increasing supplies indicate a balance will be reached before the yearend. Buyers are holding back orders on the theory lower prices may come.

Export Price List Revised

New York—Reflecting reduction in price of zinc, United States Steel Export Co., U. S. Steel subsidiary, has announced the following new export prices, effective as of Apr. 6, on carlots with freight included to New York, Philadelphia or Baltimore.

	Per Cent off List
American Standard Pipe, T. & C.:	
Butt Weld, 2½ and 3 in., galvanized	22.6
Seamless, 3½ to 6 in., galvanized..	15.1
English Gas Tubes, T. & C.:	
Butt Weld, 2½ and 3 in., galvanized	24.5

Prices are subject to seller's current list of extras and deductions and conditions of sale. All sales are subject to seller's prices in effect at time of shipment.

Steel Bars . . .

Demand for most popular sizes of hot-rolled carbon bars is well maintained

Bar Prices, Page 142

Chicago — Most popular sizes of hot-rolled carbon bars and bar-size shapes are avidly sought by consumers, diversity of industry using these probably being the sustaining factor. Cold-drawn bar supply also seems inadequate for present needs, but alloys are in restricted demand. Major difficulty with local consumers seems to be in getting enough material after each mill rolling to stretch over the intervening period until the next. For this reason, at certain intervals, possibly lasting as long as a few weeks, supply situation appears to have improved materially at both warehouse and consumer levels, only to deteriorate again later on. Thus, despite a number of mill cancellations, primarily by the railroad car and heavy truck building industries, supply-demand balance does not seem to be imminent.

Boston—Numerous consumers of carbon steel bars are not taking all tonnage allocated and, as volume of the excess rises, ex-quota supply becomes more difficult to move. Cold finishing operations are affected in some instances which is reflected in less pressure for hot-rolled bars. Demand for alloy bars also is inclined to lag and, while defense needs are contributing some demand, overall situation is easy.

Philadelphia—Carbon bar producers are having to work harder for tonnage, but so far they have been able to sustain a satisfactory level of operations. There is increasing concern, however, over schedules two and three months from now. Alloy bars are in ample supply.

Cleveland—Demand for cold-finished carbon bars continues at the lower level to which it dropped some weeks ago, and as a result one producer's order backlogs have contracted measurably. While this producer is booked practically full for the second quarter it would not be surprised if some of these orders "wash out."

Hot-rolled carbon bars remain in strong demand, this producer said, although there have been some cancellations, notably from forgers.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 142

Chicago—Determination of bar requirements for new state highway work is in abeyance pending allocation of funds by the legislature. Belief is that most work will be concentrated in the local area where currently several superhighway projects are underway. Chicago's approved road repair program, aggregating $11 million, set a new high record. Bar supply has shown a little loosening commensurate with that noted in most other products but is still far from ample.

San Francisco—Supplies are plentiful and demand is lagging. Sizes down to ⅜-inch are now readily available, whereas a few months ago sizes

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Washington Steel Corporation announces a contest with $500.00 in prizes for suggestions for new uses or applications of MicroRold stainless steel sheet and strip in gauges of .015 or thinner. Entries will be judged on the basis of economic practicability and originality by a board of three impartial judges selected by the corporation; the decisions of the board will be final. There is no limit on the number of suggestions that each entrant may submit.

By submitting an entry each contestant grants to Washington Steel Corporation the non-exclusive right to promote the manufacture and sale of any article or idea contained in the entry. All entries must be submitted on your company letterhead.

The contest closes at midnight, June 30, 1949, and all entries must be postmarked on or before that time. Winners will be notified by mail on or before July 31, 1949. Duplicate prizes will be awarded in case of ties.

Employees of Washington Steel Corporation and its advertising agency and members of their families are ineligible. The contest is subject to all applicable federal, state and local laws.

Mail entries to:
Contest Headquarters,
Washington Steel Corporation,
Washington, Pennsylvania.

WASHINGTON STEEL CORPORATION
120 WOODLAND AVENUE WASHINGTON, PENNSYLVANIA

below ½-inch were nearly unobtainable.

Seattle—Mill staffs are swamped with plans and specifications for large Alaskan construction projects, while Columbia Basin and other public works are in the market for major tonnages of reinforcing bars. This product continues in top demand. Mills are operating at peak capacity and backlogs will carry to the end of the year.

Tubular Goods . . .

Tubular Goods Prices, Page 143

Pittsburgh—Producers have reduced galvanized pipe quotations $5 per ton in line with recent drop in zinc quotations aggregating 2½ cents per pound. Exception to this general price pattern is reported by Fretz-Moon Tube Co., Butler, Pa., in reducing ⅛-inch galvanized pipe $2 while ¼ and ⅜-inch pipe was reduced $4 per ton. In addition to adjusting its galvanized pipe quotations Jones & Laughlin Steel Corp. has reduced seamless standard and line pipe $10 on 5 and 6-inch, $8 on 8-inch and $5 a ton on 10 and 12-inch size; seamless casing, all items cut $1; and seamless drill pipe reduced approximately $2 per ton. Company's quotations are now competitive with other producers. A. M. Byers Co. has reduced galvanized wrought iron pipe in line with those established by galvanized steel pipe producers.

Pittsburgh Steel Co. has reduced prices, effective as of Apr. 12, on casing, drill pipe and oil well tubing to levels quoted by leading competitors.

Los Angeles—Despite the fact that crude oil inventories are bulging, and refinery output has been cut back, drilling of new wells has increased in several of the independent and municipally owned fields. Nevertheless, there has been no overall increase in steel requirements of either the petroleum industry or the oil tool and equipment makers. With few exceptions, oil country buying has stabilized for the time being at a level adequate for little more than maintenance needs. Seasonal influences, however, are expected to change the picture. If this is to happen, it will come within the next few weeks. Generally lessened demand has made its effects apparent in tubular goods, and most categories of pipe and tubing now are in good supply.

Seattle—While inquiry for cast iron pipe continues slow, the situation has improved and considerable tonnage will be up for bids soon.

Semifinished Steel . . .

Semifinished Prices, Page 142

Pittsburgh—Another casuality of the premium priced ingot market is the Sterling Steel Foundry Co. here, which has been closed despite fact its new owners had invested considerable money enlarging and revamping the two open hearths and added charging facilities. Its creditors are seeking to sell the plant in effort to recover over $500,000. The concern had been furnishing ingots to Briggs Mfg. Co. and other interests. For the same reasons, Westinghouse Electric

has not resumed ingot operations at New Castle, Pa., under a joint operating agreement with United Engineering Co. A small open hearth at Avonmore, Pa., also has ceased producing ingots under conversion deal commitments.

Plates . . .

Plate Prices, Page 143

Pittsburgh—Jessop Steel Co. announced effective Apr. 4 the following deductions on stainless-clad plate material on individual plates weighing 4000 lbs or more: 5/8-inch gage, 1/2 cent; 3/4-in. gage, 1 cent; and 1/2 cent on each 1/8 gage up to 2-in, the deduction from base for which is 6 cents.

New York—While eastern plate mills are well booked up at the moment, most of them are in need of June tonnage. They believe they will be able to sustain a high rate of operations throughout the current quarter, but admit they will have to book more tonnage in order to do so. Not only are they interested in June tonnage, but in business for shipment beyond in most instances. One mill, engaged in the fabrication of pipe as an auxiliary operation, is well booked into the summer in this line.

Philadelphia—Plate mills are hustling to obtain sufficient tonnage to sustain a high rate of operations throughout the current quarter. Most of the producers are in a comfortable position through May, but they need more June tonnage. As a result of the recent drop of $8 a ton in the premium price at Conshohocken, Pa., the minimum delivered price on plain carbon plates here is now 3.6348c per pound; Conshohocken supplants Sparrows Point as the governing base.

Dallas—While plates are available to meet most needs, it is still difficult to obtain sufficient material to cover advance commitments. Reduction in demands for oil field pipe processing is expected to ease supplies for tank builders and others. This section is still feeling the stringency of supply due to remoteness from the principal mill centers.

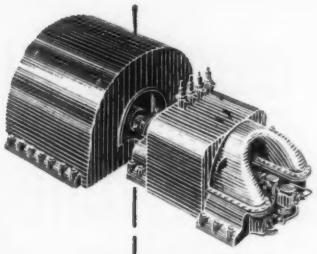
San Francisco—Heavy plates are as tight as ever. However, there are indications of easing in lighter gages. Material is not moving as fast, and eastern mills are soliciting some orders in this area.

Seattle—Sizable tonnages of plates for fuel storage, penstocks and other construction are pending in Alaska and in the Coulee area while additional demand comes from industrial sources, the outlook for fabricators indicating steady activity for the coming six months.

Structural Shapes . . .

Structural Shape Prices, Page 143

Boston—With more plain material forthcoming, inquiry for fabricated structural steel is not showing the usual seasonal increase. This, coupled with increasing competition among district shops, is resulting in slightly lower prices. Bulk of orders are on a delivery basis. Industrial building is the smallest since the war with most postwar programs about complete. Except for telephone plant ex-



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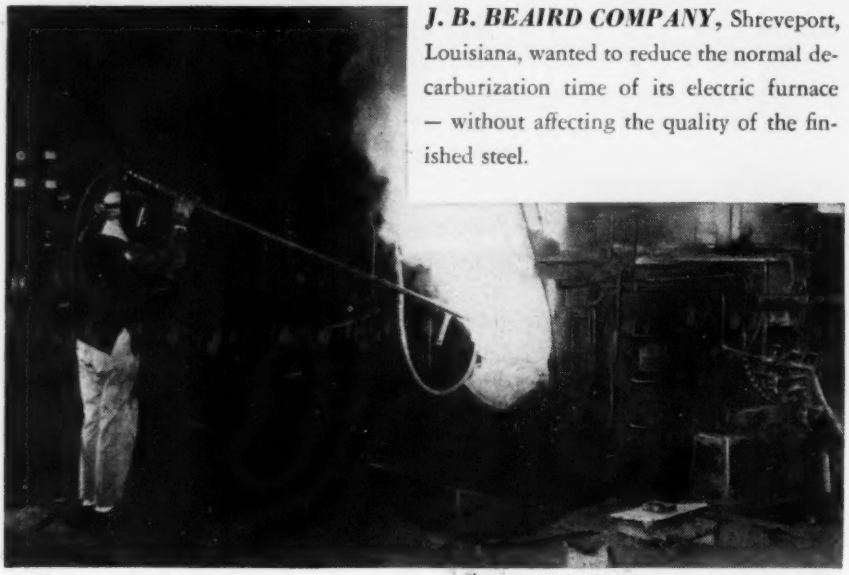

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pansion, utility inquiry is fair.

New York — Structural activity continues spotty, with awards involving principally public work. Outstanding contracts include a 2940-ton state hospital at Poughkeepsie, N. Y., and a 1490-ton hospital in Paramus, N. J.

Philadelphia—Demand for heavy structural shapes continues to lag. Competition among the smaller shops is particularly keen as order backlogs have reached a point where it is important to obtain new work to sustain current operations. As a result, prices for fabricated material are being revised downward in some instances.

Dallas—Availability of shapes with exception of wide flange items, is improving. Continued heavy construction programs in the southwestern area is still absorbing practically all supplies in sight. No price easement has developed.

Los Angeles—With the exception of one or two difficult-to-obtain items, most structurals are in more than ample supply. No resurgence of large-scale construction has appeared, although there are many projects on the board, and several fabricators report increased inquiries in recent weeks.

San Francisco—Wide flanges remain tight; most of this material is manufactured in eastern mills. Standard structural items, however, are definitely easier. New construction activity still is depressed.

Seattle — Fabricating plants have fair backlogs. Scarcity of some steel items continues to handicap operations, bidding being restricted to available supplies. Sizable tonnages are pending for various government projects.

Standard Gage for Sheets

Pittsburgh—The latest AISI manual covering carbon steel sheets includes a tabular presentation of "The Manufacturers' Standard Gage for Steel Sheets," which gage system makes possible a closer relationship between weight and thickness. This system uses the ounces per square foot of the United States standard gage as a base and provides equivalents based on 41.82 pounds per square foot per inch thick, which anticipates the variables encountered under the United States standard gage system and gives complete interchangeability between weight and thickness. This gage formula, devised several years ago, has been used throughout the industry but through force of habit is still referred to commercially by some as United States standard gage. Recent changes on part of some sheet producers have been made to correct the improper naming only; in no way affecting the price.

The United States standard gage for sheets is a weight gage base on 640 ounces per square foot per inch thick (40.00 pounds per square foot), the density of wrought iron, with each gage number representing a certain number of ounces per square foot. Since wrought iron is approximately 2 per cent lighter than rolled steel, approximate equivalent thicknesses then were increased by this amount to compensate for the dif-

ference. Resulting approximate thicknesses (based on 40.80 pounds per square foot per inch thick) were found not to be correct for sheets since sheets are thicker at the middle than at the sides and are rolled with width and length tolerances, all on the plus side of the ordered dimensions.

Tin Plate . . .

Tin Plate Prices, Page 143

Washington—An export quota of 100,000 net tons of tin plate, to be supported by priority ratings and shipped during third quarter, was established last week by the Department of Commerce following consultation with the Tinplate Industry Advisory Committee. The rated quota set for the third quarter is 13,000 tons below that for second quarter.

Approved foreign orders for tin plate, up to the 100,000-ton limit, will be supported by ratings (CXS) and must be accepted by the tin mills. Additional quantities of tin plate, up to 45,000 tons, may be licensed but will not be rated for export during third quarter. Of this total, at least 12,000 tons must consist of 50-lb electrolytic plate and special coated manufacturing ternes for uses permitted under Allocation Order M-43, including use abroad by American oil companies.

The remainder of the unlicensed unrated quota may be licensed for export at the discretion of the Office of International Trade. The unrated quota of 45,000 tons represents a 28,000 ton increase over the 17,000 tons authorized but not rated for export during the previous quarter.

Export Steel Controls Relaxed

Washington—Relaxation of export controls over a large number of iron and steel products was announced last week by the Office of International Trade, Department of Commerce. The action provides for removal of quantitative export quotas on 27 products including certain types of wire mills products, rails, ingots, billets, bars, sheet, strip, pipe, structural shapes, forgings, and railway car wheels. In addition export quotas have been increased on nails miscellaneous pipe fittings. Also, certain reject iron and steel items may now be exported to all destinations outside Europe and adjacent areas without obtaining validated licenses. However, such shipments must be accompanied by an inspection report from the mill supplying them or from a recognized testing laboratory.

The action was made possible by easing domestic supply conditions as well as reduced firm demand from abroad. However, controls will not be relaxed at this time on still tight flat-rolled and tubular products such as plates, galvanized sheets, galvanized pipe, large diameter pipe and electrical steel, transformer grade.

Iron Ore . . .

Iron Ore Prices, Page 144

Cleveland—Natural iron content of

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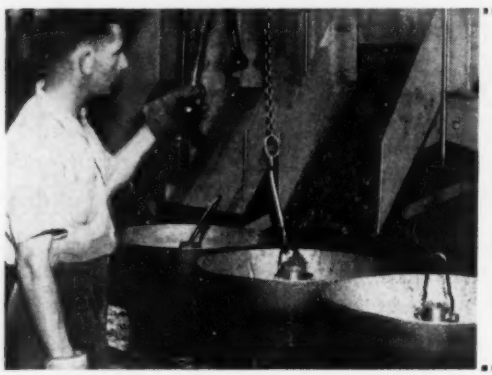

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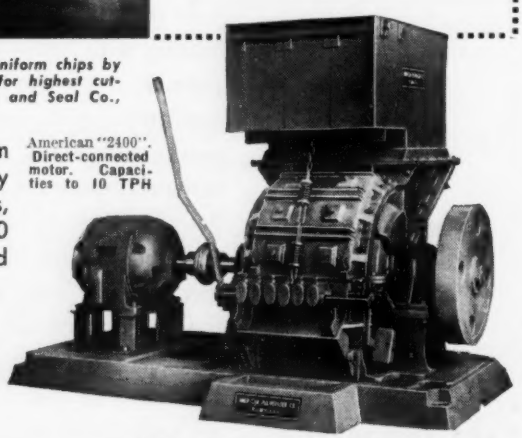

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Lake Superior iron ore shipments from United States ranges has declined to the lowest point in recent years, having been 51.83 per cent in 1941 compared with 50.49 per cent last year, according to the Lake Superior Iron Ore Association, this city. At the same time the phosphorous content has increased from 0.085 per cent in 1941 to 0.093 per cent in 1948. The average analyses for 1948 and 1947, respectively, showed 9.30 per cent and 9.09 per cent silica, 0.76 per cent and 0.75 per cent manganese; 11.35 per cent and 11.28 per cent moisture. Total shipments amounted to 82,655,757 tons in 1948 compared with 77,210,278 tons in the preceding year. Shipments from the Michipicoten range, totaling 507,231 tons, showed a natural iron content of 49.69 per cent in 1948 while those from the Steel Rock district in Canada, totaling 679,233 tons, showed a natural iron content of 52.66 per cent.

Shipments of Lake Superior iron ore totaled 2,071,577 tons during the week ended Apr. 11 compared with 1,217,663 tons in the preceding week. This brought the cumulative total for the season to 3,326,948 tons, of which United States ports accounted for 3,300,974 tons. The latter figure represents an increase of 2,234,261 tons over the total for the like 1948 period.

Pig Iron . . .

Pig Iron Prices, Page 144

Pittsburgh—Rumors to effect merchant pig iron sellers are beginning to equalize freight in meeting competition could not be confirmed here last week. Sharp reduction in cast scrap prices to levels more than $10 below that of pig iron and fact some furnace interests are currently forced to channel a portion of their production into stock, has led to conjectures as to price cuts on merchant iron. Such action, rather than freight equalization, is held more logical in light of legal pricing limitations involved. All 30 blast furnaces of U. S. Steel Corp.'s subsidiaries in Pittburgh district were in operation last week for the third time in company's history and first time since November, 1947.

Pittsburgh Steel Co. has suspended operations of its No. 2 blast furnace at Monessen due to falling off in pig iron demand, and it may be necessary to also suspend output at company's No. 1 blast furnace. Output from company's No. 3 blast furnace, purchased from DPC and rated at 1100 tons, will supply sufficient iron at lower cost for full steelmaking requirements. The No. 3 furnace, capable of producing over 1200 tons per heat, has about the same capacity as numbers 1 and 2 furnaces combined.

New York—Pig iron demand continues sluggish, with most producers now accumulating some stock. Premium price producers are still making adjustments, with the Swedeland, Pa., producer reducing its prices $2 a ton to the same base level as the Bethlehem, Pa., producer.

Boston—Heavier demand for castings is expected to develop in some quarters, but this is not reflected in any material increase in pig iron buying. Iron inventories include some

substantial tonnages of high-cost foreign metal in some instances, notably among the larger buyers. The district furnace is accumulating a moderate reserve of pig iron. More outside tonnage is available, including steelworks iron. The critical edge in basic supply also is dulled with additional tonnage available.

Philadelphia—Reduction of $2 a ton in the pig iron prices at Swedeland, Pa., has reduced the minimum delivered price at Philadelphia to $49.39 on basic and $49.89 on No. 2 foundry iron. The change brought furnace prices at Swedeland to a parity with furnace prices at Bethlehem, Pa., but, with lower rates on shipments to Philadelphia, Swedeland again becomes the governing base on shipments into this city, as is normally the case.

Chicago—Status quo at a relatively low melting level is being maintained in the foundry industry, pickup in certain fields and tapering off elsewhere offsetting each other. Job shops for the most part are on a 3 to 4 day basis of operations, while captive plants are following no set pattern, line of product governing. Automotive and agricultural needs generally appear at the top of the lineup and present indications are for no immediate letdown. Pig iron sellers generally have abandoned quota systems after false starts in this direction earlier in the year. Doubts are entertained that iron prices can or will be reduced at an early date, higher ore and most other costs working against such action. Too, sellers ask whether lower prices would stimulate demand. Consensus locally is that inventories of premium priced iron have not yet been completely worked off and the true measure of buying strength will not occur until this happens. Meanwhile, price shading and extensive sales activity are noted by castings users.

Buffalo—A sharp falling off in fresh demand for freight car and steel locomotive castings caused a drastic shrinkage in order backlogs of two top producing foundries in these lines. Although still melting five days a week, Symington-Gould's Depew plant reported its backlog at the lowest level in ten years. In addition, the company announced that prices had been reduced on several of its principal items. Prices effected and the extent of price cuts were not revealed. The company said that "new freight-car-buying programs are almost nonexistent at present." Pratt & Letchworth also found a slackening in railroad buying, and reported its order backlog has decreased to about three months at the rate of present operations.

Easement was apparent throughout the foundry trade. Makers of standard castings were reported building up inventory stocks to be in a position to make immediate deliveries when the demand appears. Prices continue to hold steady, so far unaffected by the cut in silvery iron at Niagara Falls.

Cleveland—Demand for pig iron remains at the lower level to which it dropped at the beginning of April. Even producers selling at the regular price of $46.50 a gross ton for No. 2 foundry iron are feeling the pinch for the first time this month. One producer which heretofore has had more orders than it could supply is now hoping it will get enough orders to take up this month's output of merchant iron.

Cincinnati—Pig iron is available in excess of current demand. An important factor in the buying lag is a general desire by melters to cut stocks of iron so low that many are on a hand-to-mouth basis. Meanwhile, the district melt averages three days, in many instances the schedule reflecting attempts to retain labor forces.

Birmingham—Pig iron market here shows a slight softening, due to reduced operations by soil pipe manufacturers. Demand from pressure pipe companies remains strong.

Warehouse . . .

Warehouse Prices, Page 145

Cleveland—In expectation of lower prices at warehouses, consumers are holding steel purchases to a minimum. Despite this resistance, demand is still at a good level, according to a leading warehouse here. However, the lowered demand level has helped improve warehouse stocks, although there is still room for improvement in some products, notably plates and light flat bars. Demand for alloy products has eased considerably, although orders for stainless continue in surprisingly good ever. Present buying is largely on a month to month basis.

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volume.

Reflecting the overall lower demand for steel, one warehouse here reported offers of tonnage from mills which have not been serving it in the last few years.

Pittsburgh—Steel distributors have established $2 per ton lower base prices on 10 gage galvanized sheet to reflect initial 1½ cent per pound reduction in zinc. The Apr. 5 decline of one cent in zinc does not affect price for 10 gage base galvanized sheet, with result that downward adjustments ranging from 5 to 15 cents per 100 pounds are applicable to 14 gage and lighter. Warehouse steel inventories are in satisfactory balance with demand except for hot-rolled strip and structural shapes. Some distributors have been offered substantial sheet, bar, wire and plate tonnnages in excess of regular mill allotments. Distribution of warehouse steel items is on a more competitive basis than earlier this year, as indicated by elimination of price spreads quoted among leading interests.

Philadelphia—While jobbing business is still active, volume so far this month is below the March rate. Reflecting the change in mill prices, jobbers have reduced quotations on galvanized sheets.

Chicago—Inability to build up stocks of the most wanted products —shapes, plates and pipe—continues to plague warehousemen, and in most other carbon products and some alloy items selection continues limited, one interest reporting its bar inventory is only about 10 per cent of normal with the thinness spread over its entire range of sizes. A slowing down of the rate of decline in order inquiry has been noted, some industries—notably construction—now experiencing a spring upturn and intensifying demand. Reduced draught under which many stampers are operating has relieved some of the pressure for sheets, but with major distributors' stocks, especially in the heavier gages and wider widths, are still low although augmented somewhat by customer turn-backs. Demand for secondary products is restricted and warehouses specializing in these are bush-beating for business.

Cincinnati — Sales from warehouse continue at a good level, although demand has sagged in recent weeks, part of the decline due to gradual disappearance from this market of normal mill customers. Jobbers' inventories are coming into better balance on improved mill shipments. Sheets are easier. Plates and structurals remain scarce.

Los Angeles—Jobbers' stocks are greatly improved, and show better balance, with the exception of plates and light gage sheets. A little more optimistic outlook is evidenced by warehousemen, one jobber reporting that his order rate is up 10 per cent since the first of April.

San Francisco — Warehouse steel business is slow with consumers buying only for immediate needs. Heavier cancellations of mill tonnages are reported, as fabricator inventories pileup. Steel bars, including reinforcing, are plentiful in most warehouses; pipe is easier; wire products are soft; most structural items, excepting wide flanges, are in ample supply. Sheets, strip and plates continue to be the tightest products.

Seattle—Decline in zinc prices is reflected in a downward revision of galvanized items by jobbers in this area. The cut averages $1 per 100 lb. Galvanized sheets have been reduced from 8.40c to 8.25c. Demand is improving and April is expected to exceed in volume any month since November.

Scrap . . .

Prices continue to decline in principal consuming districts on light sales

Scrap Prices, Page 148

Pittsburgh — Continued downtrend in scrap quotations was in evidence last week on sale of small tonnage of No. 1 heavy melting steel by a broker to one mill in this area for $25, a decline of $2 from preceding week's quotation. In a normal market this small lot purchase of slightly over 1000 tons would not have been significant enough to establish a price level. However, continued lightness of mill buying leaves no alternative. Quotations for the other open-hearth grades also are considered correspondingly lower in line with established differentials. Substantiating these price levels are reported offers of brokers to buy No. 2 heavy melting at $22. No new sales of turnings are reported, with quotations based on brokers' offering sale price. Lower offering prices are noted for cast scrap items, with no takers. Railroad scrap quotations also are lower. Reluctance of leading consumers to contract for relatively large tonnages of dealer scrap will undoubtedly weaken quotations to perhaps below former OPA ceilings before being stabilized. Mills' scrap inventories were augmented substantially throughout first quarter despite record breaking steel production. Favorable weather, near record metalworking activity and relatively large shipments of German scrap were contributing factors.

New York—Brokers' buying prices held nominally unchanged here last week in an extremely quiet market.

Boston—Prices on open-hearth and foundry grades of scrap have sagged further, although there has been little buying to give the price structure a real test. Cast iron scrap deliveries are limited largely to scattered small lots with larger users drawing on inventories, including scrap which cost more than twice the current price. Unprepared steel scrap dropped to $10 and the schedule for open-hearth grades is substantially below former quotations.

Watervliet, N. Y.—Salvage section of the War Department's arsenal here is seeking bids on sale of 100 gross tons of unprepared heavy melting steel scrap, 25 tons of miscellaneous iron and steel scrap, and 175 tons of prepared heavy melting steel scrap. Bids are due May 3.

Philadelphia — While cast iron grades of scrap are generally unchanged, steel scrap prices continue to decline. With trading still light, No. 1 heavy melting is $23-$23.50, delivered; No. 2 melting and No. 1 busheling, $21-$21.50; No. 1 bundles,

$23-$23.50; No. 2 bundles, $19; machine shop turnings, $15; mixed borings and turnings, $14; short shovel turnings, $20; bar crop and plate, and punchings and plate scrap, $27; cut structurals, $25; heavy turnings, $23-$24.

Detroit—No. 2 bundles, No. 2 heavy melting, No. 1 busheling, electric furnace plate scrap and all cast iron grades have sagged another $2 a ton, and market sentiment remains decidedly bearish. Scattered purchases of 1000-ton lots or less by mills are reported, apparently just to test the market. Automotive lists scheduled to appear early in May should provide further test of the market. Barring large-scale resumption of mill buying, the outlook is for still lower quotations.

Cleveland—Further weakness pervaded the scrap market here last week, with the result quotations, most of which were nominal, declined another dollar. Heavy melting steel was quoted nominally at $21, and No. 1 cupola nominally at $34-$35.

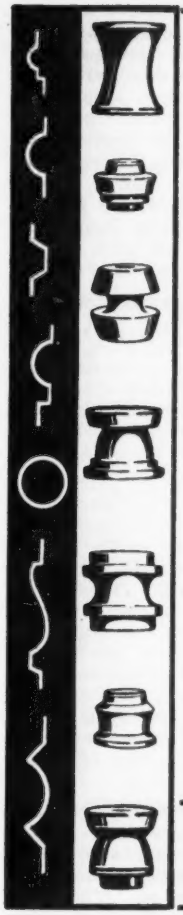
Some trade observers believe the market will weaken further to around $18 for heavy melting steel before stability returns to the market, and that May will be even a poorer one in the scrap trade than any thus far this year.

Cincinnati—Scrap prices have taken another nose-dive, No. 1 heavy melting steel being quotable at $21.50. Borings and turnings are down to $11. Rails and cast are also down abruptly. Brokers have resumed differentials on No. 1 and No. 2 heavy melting steel, also on No. 1 and No. 2 bundles. Tonnage buying continues absent and only offerings at lowered prices attract melters. Many scrap melters are anxious to reduce inventories before re-entering the market.

Chicago—Prices moved onto lower ground again last week primarily on the basis of brokers' offerings. What buying occurs, and last week there were scattered sales made in several major grades, is followed almost immediately with new, lower offering prices. Foundry and electric furnace grades have bogged down, and increasing difficulty in moving these out of generators' plants is noted, dealers working hard to keep inventories of all grades, and especially unwanted ones, low.

Buffalo—While weakness continues to dominate the scrap trade here, mixed tendencies appeared in the turnings market. Small sales of cast iron borings and mixed borings were reported at $18 a ton, about $1 above the previous week. On the other hand, machine shop turnings were offered at $15 a ton, $1 to $1.50 a ton below the previous week, with no takers. Low Phos was down slightly following a small sale. A restricted sale of cast scrap was also reported within the prevailing price range. Failure of the railroad lists to be more fully publicized was disappointing to dealers who were looking for price guidance.

Leading mill consumers showed no indication of returning to the market at this time. Buyers expressed a willingness to do business within prevailing ranges on steelmaking grades, but mills preferred to pro-



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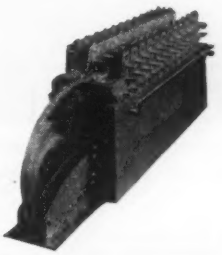

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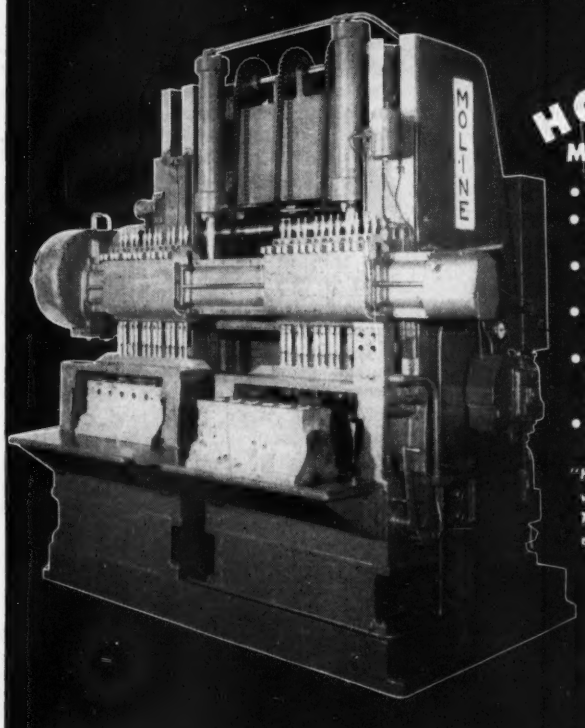

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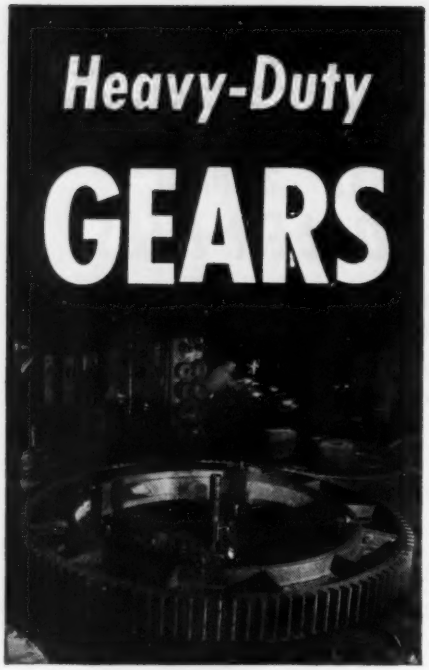

Cutting the teeth in a large diameter spur gear in the Simonds shop.

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When you need large or heavy-duty gears for new industrial equipment—for special machinery—for repairs or replacements—call on SIMONDS GEAR where they have been a specialty for more than 50 years. SIMONDS GEAR assures you of personalized attention to your specific requirements—faithful reproduction of your most exacting specifications—and faster service because SIMONDS' production is geared to specialized work. For all types of heavy-duty gears ranging to 145" dia. in materials including cast or forged steel, gray iron, bronze, silent steel, rawhide and bakelite—send your inquiry to SIMONDS GEAR.

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long their sidelines stand.

Birmingham—The scrap market in this area remains in the doldrums and prices are largely nominal for all grades. Republic Steel Corp. has purchased relatively small tonnages of No. 2 heavy melting steel at $22, which was $7 under the former price paid for that grade. No. 1 cupola cast is reported to have sold for $32 but pipe shops and other large consumers of cast iron are still out of the market.

Dallas—New low prices failed to develop any orders here last week. Activity remains almost at a standstill. One large dealer one day last week had three carloads of metal ready for consignment which completed every commitment he had in his office.

Los Angeles—Although price quotations are unchanged, revisions have been made in mill specifications which in effect reduce scrap costs to the buyer from 75 cents to $2 per gross ton. Principal change involves a shift in the basing point system, from an f.o.b. mill basis to f.o.b. supplier's yard. Dealers will now absorb the switching and trucking charges which mills have been paying. Buying continues light, with several mills filling their current requirements almost entirely from stockpiles and off-shore shipments.

Seattle — Steel scrap prices are steady at the new base price of $22 for no. 1 heavy. Receipts are sufficient for current consumption and additions to inventories. The outlook has improved in the last sixty days. Foundries report the going price for No. 1 cupola cast is $30 with supply ample for current requirements. Some electric furnaces are paying $30 in car lots, for No. 1, 12 inches and under, $25 to wagon deliveries.

Canada . . .

Toronto, Ont.—Iron and steel production in Canada during February was at a higher daily average than in January, but total output was off slightly owing to the shorter month. For February, pig iron output totaled 172,724 net tons or 82 per cent of capacity compared with 78.5 per cent for January. February production included 141,222 tons of basic iron, 20,386 tons of foundry iron, and 11,116 tons of malleable iron.

Production of ferro alloys in February amounted to 21,713 net tons.

In February, production of steel ingots and castings totaled 259,271 net tons, or 89.1 per cent of capacity compared with 88.4 per cent for January.

Charges to steel furnaces in February included 133,982 tons of pig iron; 75,745 tons of home scrap and 77,043 tons of purchased scrap.

Following are comparative production figures for iron and steel in net tons:

	Steel Ingots Castings	Pig Iron	Ferro-alloys
Feb., 1949	259,271	172,724	21,713
Jan., 1949	284,707	183,074	21,931
Feb., 1948	239,646	151,123	11,823
Two Mos., 1949	543,987	355,798	43,644
Two Mos., 1948	496,372	311,165	28,948
Two Mos., 1947	479,020	327,945	19,001

Government Compiles Price Data

IF H. R. 2756—the Spence bill to give the President various standby economic controls and authorize him to build steel and other plants at government expense—comes to active hearings, a very interesting agenda will be carried out.

In its preparations to study this measure, the House Banking & Currency Committee decided on a thorough study of the spread between producers' and distributors' selling prices. The study was predicated on an impression that middlemen are unduly slow in giving the benefit of lower producers' prices to ultimate consumers; for instance, the committee felt recent reductions in farm prices were too slow in reaching housewives in gocery stores and meat markets.

To prepare for the hearings, such departments as Commerce, Labor and Agriculture have been analyzing the marketing and price situation, and Commerce called in its Wholesale Distributors Advisory Committee to discuss the whole subject.

With the Democratic leadership having abandoned, at least for the present, the attempt to get the Spence bill enacted, the committee has postponed this study indefinitely.

Value of Tool Reserve Stressed

VALUE to the nation of Joint Army and Navy Tool Reserve Program in view of the current low operating level of the machine tool industry was emphasized in the Munition Board's recent report to Congress. The board pointed out that in 1948 machine tool output totaled $288 million while the physical plant of the industry is capable of producing tools worth over $600 million at current prices without subcontracting.

Since machine tool production requires highly trained personnel, the Munitions Board states, the working forces are not easily expanded. Employment in the machine tool industry which rose to a peak of 109,700 in 1943, not including many additional individuals who were engaged in manufacture of parts by subcontractors, has slumped to about 47,000 persons.

Most of the machine tools in the government's reserve were acquired as part of the Janmat authorization of 182,000 tools of various descriptions to be selected for storage from those owned by the government. To date approximately 130,000 tools have been located and tagged, with 92,000 of these having already been sent to permanent storage warehouses.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2340 tons, state hospital, Poughkeepsie, N. Y., through Merritt-Chapman & Scott Corp., New York, to Lehigh Structural Steel Co., Allentown, Pa.

2160 tons, approach, spans and bascule span for state project in Ocean county, New Jersey, through Ole Hansen & Sons, Pleasantville, N. J., to Bethlehem Steel Co.

1490 tons, Bergen Pines hospital, Paramus, N. J., to Harris Structural Steel Co., New York.

750 tons, section of the state express highway, Bronx, New York, through Tulley & Di Napoli, to Harris Structural Steel Co., New York.

650 tons, Portland, Oreg., branch Federal Reserve Bank $2.5 million project, to Gunderson Bros. Engineering Corp., Portland; bids for general contract Apr. 28; Pietro Belluschi, architect.

525 tons, gates and anchorages, power plant, New England Power Co., Wilder, Vt., to American Bridge Co., Pittsburgh.

385 tons, warehouse, G. E. Realty Co., Long Island City, to Belmont Iron Works, Eddystone, Pa.

375 tons, Cross Bay section, state Cross Bay Blvd., Jamaica, Long Island, through Gull Contracting Co., to Phoenix Bridge Corp., Phoenixville, Pa.

300 tons, manufacturing building, Ehret Magnesia Mfg. Co., Valley Forge, Pa., to Morris, Wheeler & Co., Philadelphia.

230 tons, addition, Marine Theatre, Brooklyn, N. Y., to Schacht Steel Construction Co. Inc., New York.

160 tons, addition, St. Martins church, Philadelphia, to Bethlehem Steel Co.

150 tons, state bridge, Ulster county, New York, to Bethlehem Steel Co.

125 tons, laboratory and office building, Merck & Co., Rahway, N. J., to Savery & Glazer.

STRUCTURAL STEEL PENDING

5200 tons, municipal Jackson Pier, S0, South, Philadelphia; opening bids postponed from Apr. 18 to Apr. 21.

2500 tons, Pennsylvania Railroad warehouse, Pittsburgh; Ingalls Iron Works Co., Birmingham, low bidder.

1850 tons, state hospital, Binghamton, N. Y.; bids closed Apr. 13, after having been postponed from Apr. 6.

1000 tons, 1-story parts depot, International Harvester Co., Menands, N. Y., bids closed Apr. 13.

750 tons, state bridge, Middlesex county, New Jersey; bids Apr. 28.

600 tons, Ladd field powerhouse, Alaska; Kiewit-Morrison, Knudsen Co., awarded general contract at $3,090,000.

835 tons, 3-story rack building, Parraffine Co. Inc., Metuchen, N. J.; bids asked.

400 tons, addition, Public School No. 81, Bronx, New York; bids asked.

350 tons, 2-story building, General Analine Works, Grasselli, N. J.; bids asked.

300 tons, additional towers for Bonneville Power Administration; Isaacson Iron Works, Seattle, low.

250 tons, section state turnpike, Dauphon county, Pennsylvania; C. J. Langenfelder, Baltimore, low on general contract.

200 tons, state bridge, Great Barrington, Mass.; bids Apr. 20 direct on steel, fabrication and erection.

175 tons, 1-story garage, Jerome Ave., Bronx, New York; bids asked.

120 tons, Parochial school, Williston Park, Long Island; bids Apr. 21.

105 tons, state bridge, Sussex county, New Jersey; bids Apr. 28.

Unstated, 12 sets bulkhead gates, frames, etc., Hungry Horse dam; bids to Bureau of Reclamation, Denver, May 5.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1200 to 1500 tons, addition to Gorge power house, Seattle light department, to Northwest Steel Rolling Mills Inc., Seattle; Guy F. Atkinson Co., Seattle, general contractor.

327 tons, apartment, 1350 Astor St., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

270 tons, grain storage bins for Centennial Milling Co., Spokane, Wash., and grain elevator Davenport, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle; Henry George & Sons, Spokane, general contractor.

165 tons, gas building, Illinois Institute of Technology, Chicago, to Joseph T. Ryerson & Son Inc., Chicago; Sumner S. Sollitt & Co., Chicago, general contractor.

REINFORCING BARS PENDING

2000 tons, Canyon Ferry dam, Missouri river, Montana; Canyon Constructors Syndicate, low $11,896,425, to Bureau of Reclamation, Denver.

1200 tons, state bridge, Pennsgrove Ave., Philadelphia; bids Apr. 29.

350 tons, power plant, Ames, Iowa; bids asked.

245 tons, mens' dormitory, Northwestern University, Evanston, Ill.; bids asked.

Unstated, 15th Ave. N.E. bridge, King county, Wash.; S. S. Mullen Construction Co., Seattle, low $132,058, awarded general contract.

PLATES . . .

PLATES PENDING

160 tons or more, penstock and gates for Hungry Horse dam, Montana; bids to Bureau of Reclamation, Denver, about Apr. 28.

Unstated, sheet steel piling for 210-foot wall, repairs to Caisson No. 3, Puget Sound Navy yard; bids Apr. 22.

PIPE . . .

STEEL PIPE PLACED

3447 tons, Consolidated Edison Co., New York City, 2147 tons of 30-inch pipe going to Armco Steel Corp., Middletown, O., and 1300 tons of 24 and 26 inch pipe to National Tube Co., Pittsburgh.

Unstated, materials for Vancouver, Wash., substation of Bonneville Power Administration, to Consolidated Supply Co., Portland, Oreg., low $12,317.

CAST IRON PIPE PENDING

1000 tons, mostly 12 inch, local improvement, Tacoma, Wash.; general contract to Valley Construction Co., Seattle.

Unstated, 3000 feet 4 and 6 inch, also accessories, for District No. 49, Burien, Seattle; bids opened Apr. 15.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Atlantic & Danville, six 1500-horsepower road diesel locomotives to American Locomotive Co., New York.

FERROALLOYS

(*Continued from Page* 145)

packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 14.65-15c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe.) C.l., lump, bulk, regular 19.0c per lb of Si c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade.

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Deduct 0.4c for max 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 8.15c per lb of alloy, ton lots packed 9.55c, 200 to 1999 lb 9.90c, smaller lots 10.40c, Delivered. Spot up 0.5c.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Contract, 10,000 lb W. or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W., $3.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr. c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., SMxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max, 0.03% C 31.85c per lb of contained Cr, 0.04% C 29-75c, 0.06% C 28.75c, 0.10% C 28.25c- 28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lot 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max. 0.50% C grade, $1.03 per lb of contained chromium. ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot, add 0.25c.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max, C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed. ¼" x 12 M, 16.5c per lb of alloy, ton lots 17.25c, less ton 18.5. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l, packed, 16.50-17.00c per lb of alloy; ton lots 17.90-18.00c; less ton lots 19.40-19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 11c, ton lots 11.25c, smaller lots 11.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base): Gross tons per carload, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn.; $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo. f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.10.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.

CONSTRUCTION AND ENTERPRISE

ALABAMA

MOBILE, ALA. — Hollingsworth & Whitney Co., Magazine Point, has awarded a $10.5 million contract to Rust Engineering Co., Exchange Bldg., Birmingham, for a mill expansion; Fay, Spofford & Thorndike, 11 Beacon St., Boston, engineer.

CALIFORNIA

LOS ANGELES—Keuffel & Esser Co., New York, manufacturer of drafting and engineering equipment, will modernize a four-story plant at 1327 S. Olive St., and construct a two-story office building and warehouse. Total cost will exceed $500,000.

OAKLAND, CALIF.—Daniel Gallagher Teaming Co., 2510 Wood St., has awarded a $150,000 contract to M. J. King Inc., 231 Franklin St., San Francisco, for construction of a warehouse; J. Lloyd Conrich, 593 Market St., San Francisco, architect.

SAN FRANCISCO—General Paint Corp., 2627 Army St., has awarded a $200,000 contract to Barrett & Hilp, 918 Harrison St., San Francisco, for construction of a resin manufacturing unit.

COLORADO

DENVER—Bureau of Reclamation will receive bids May 10 for three transformers and three resistors for Coulee dam project.

FLORIDA

GREEN COVE SPRINGS, FLA. — Florida Power & Light Co., Ingraham Bldg., Miami, Fla., will build a $10 million power plant on St. Johns river.

MIAMI, FLA. — Miami Fish Producers Exchange Inc., 25 SW South River Dr., has awarded a $300,000 contract to Standard Refrigeration Equipment Service, 1760 W. Flagler St., for a warehouse; George D. Moffat, 1764 NW North River Dr., engineer.

GEORGIA

ALBANY, GA.—Graton & Knight Corp., 356 Franklin St., Worcester, Mass., will erect a $1 million tannery for its subsidiary, Dixie Leather Corp.

IDAHO

LEWISTON, IDAHO—Wellman Clark, president, Lewiston Area Development Associates Inc., announces plans to establish a 3000 barrel daily capacity cement plant, financed by Eastern capital.

ILLINOIS

CHICAGO—E. H. Sargent & Co., 155 E. Superior St., will build a $1 million factory and office; plans by Olsen & Urbain, 5 S. Wabash St.

CHICAGO—D. E. Kennedy Inc., 222 N. Bank Dr., has awarded a $200,000 contract to Fallon, O'Donovan & Rassas, 4619 School St., for construction of a factory.

CHICAGO—Carson Pirie Scott & Co., 1 S. State St., will build a $3.5 million warehouse, 7100 S. Cicero Ave.; plans by DeYoung, Moscowitz & Rosenberg, 205 E. 42nd St., New York.

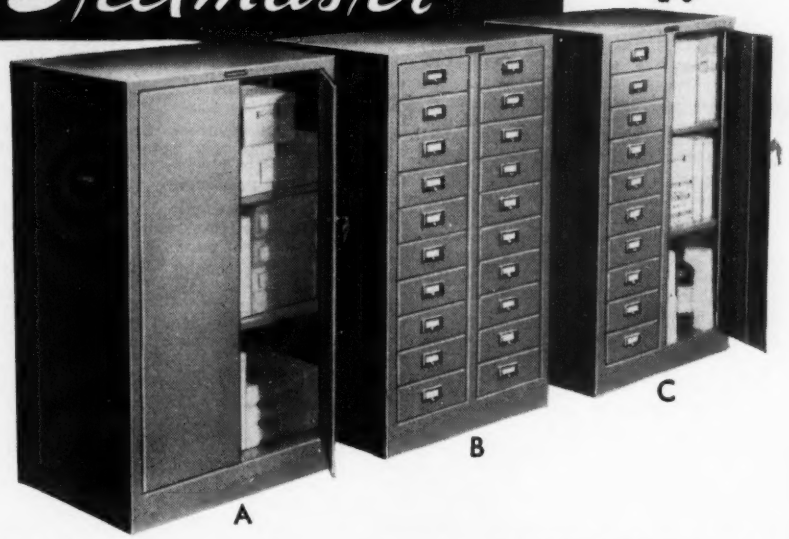
HIGHLAND, ILL.—St. Joseph's Hospital, Sister Theodosia, superior, has awarded a $1 million contract to W. H. Franklin Co., P. O. Box 242, Springfield, Ill., for construction of a hospital; Henry R. Helmle, First National Bank Bldg., Springfield, architect.

WHEATON, ILL.—Illinois Bell Telephone Co., 212 W. Washington St., has awarded a $1,860,000 contract to Heidel & Beck, 6235 S. Michigan Ave., Chicago, for construction of a telephone exchange building; Shaw, Metz & Dolio, 208 S. LaSalle St., Chicago, architect.

INDIANA

HAMMOND, IND.—Screw Conveyor Corp., 700 Hoffman St., has awarded a $200,000 con-

Steelmaster



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(B) 1620 – 20-drawer storage unit – 36½" H. – 24" W. – 16" D. Dr. Dim. 8¾" W. – 3" H. – 15¾" D. Compartmented on 1" centers–12 separate compartments. **$49.50**

(C) 1610 – Combo 10-drawer and storage cabinet unit. Dr. Dim. 8¾" W.–3" H.–15¾" D. 3 storage compartments. 36½" H.–24" H.–16" D. **$39.50**

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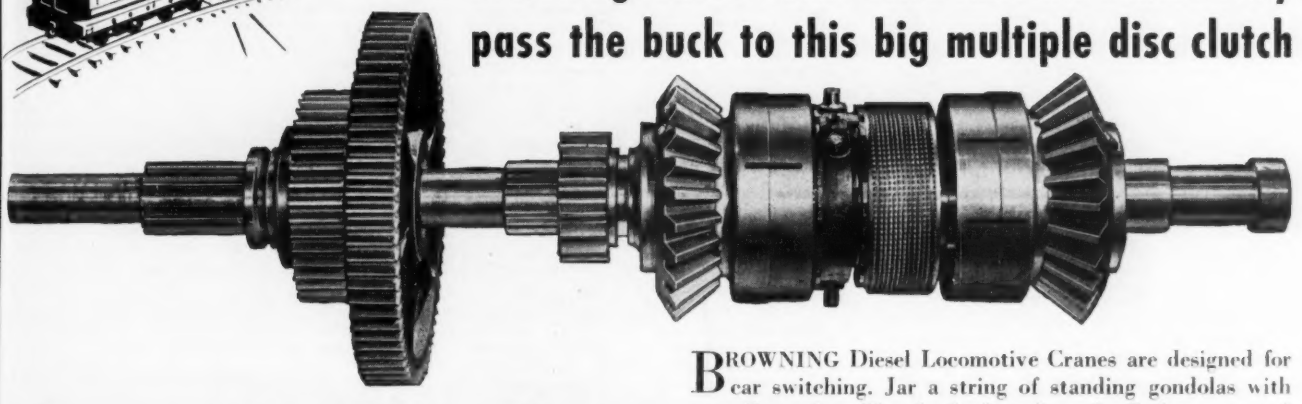

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tract to Peter Becker, 308 W. Elizabeth St., Calumet City, Ind., for construction of a factory; Bachman & Bertram, 5116 Hohman Ave., architect.

IOWA

BURLINGTON, IOWA — Lagomarcino-Grupe Co., 101 Valley St., has awarded a $150,000 contract to Carl A. Nelson & Co. for construction of a plant.

IOWA CITY, IOWA—State Board of Education, Des Moines, Iowa, has awarded a $1,108,130 contract to Weitz Co. Inc., 406 Fleming Bldg., Des Moines, for construction of a library at University of Iowa.

KANSAS

MANHATTAN, KANS.—State Board of Regents, Topeka, Kans., has awarded a $1,540,492 contract to Bennett Construction Co., 1805 Harrison St., Topeka, for construction of a field house and gymnasium building, Kansas State College.

MINNESOTA

FERGUS FALLS, MINN.—Otter Tail Power Co., C. Wright, general manager, will build a $3 million generating plant, Hoot Lake near Fergus Falls.

MISSISSIPPI

HATTIESBURG, MISS. — Mississippi Power Co., Gulfport, Miss., contemplates construction of a new steam-generating plant; estimated cost $1.5 million.

YAZOO CITY, MISS.—Mississippi Chemical Corp., Owen Cooper, executive vice president, Jackson, Miss., plans bond election Apr. 22 to vote on $750,000 bond issue to provide a site for a $12 million anyhydrous ammonia fertilizer plant.

MISSOURI

ST. JOSEPH, MO.—Associated Grocers, 804 S. 14th St., will build a $300,000 warehouse.

MONTANA

HAVRE, MONT.—Great Northern Railway has awarded a $324,604 contract to O'Neill Construction Co. for construction of stalls in diesel plant, and $146,447 for remodeling local depot.

NEBRASKA

COLUMBUS, NEBR.—Becton, Dickinson & Co., Cornelia St., East Rutherford, N. J., will build a $300,000 plant manufacturing thermometers.

LINCOLN, NEBR.—Lincoln Development Co., 13th and M Sts., will build a $400,000 parking garage; plans by M. I. Aitken, Stuart Bldg., and Clark & Enersen, 1414 Sharp Bldg.

OMAHA, NEBR.—P. F. Petersen Baking Co., 12th and Jackson Sts., will build a $350,000 plant, 72nd and Dodge Sts.

NEW MEXICO

DEMING, N. MEX.—American Smelting & Refining Co., 120 Broadway, New York, has awarded a $600,000 contract to Stearns-Rogers Mfg. Co., 1718-20 California St., Denver, for construction of a plant.

NEW YORK

NEWBURGH, N. Y.—Central Hudson Gas & Electric Corp., South Ave., Poughkeepsie, N. Y., will build a $1 million steam plant to generate electricity at Dannskammer Point on west side of Hudson near Newburgh.

OHIO

BUCYRUS, O.—New York Central Railroad, E. A. Dougherty, chief engineer, LaSalle St. Station, Chicago, will spend $300,000 to convert car repair shop to diesel repair and maintenance plant.

CINCINNATI—City Hall, Nine and Plum Sts., has awarded two general contracts to Frank Messer & Sons Inc., 4612 Paddock Rd., for $744,946 and $903,165 in construction of waterlines, pump and station; Black & Veatch, 4706 Broadway, Kansas City, Mo., engineer.

CINCINNATI—Prudential Insurance Co., 763 Broad St., Newark, N. J., has awarded a $6.5 million contract to J. & E. Warm Co., 2335 Florence Ave., for construction of apartments; Harry Price, 6200 Reading Rd., architect, W. C. Pisiter, 4 W. Seventh St., engineer.

CINCINNATI—Wing Machine Tool Division of American Steel Foundries, 400 N. Michigan Ave., Chicago, has awarded an $800,000 contract to Thorgersen & Ericksen, 228 N. LaSalle St., Chicago, for construction of a factory; Monroe Bowman & Associates, 221 N. LaSalle St., Chicago, architect.

CLEVELAND—Andersen Furnace Lining Co. has been formed by Harold R. Andersen, South Euclid, O., to install brick and monolithic linings for industrial furnaces.

CLEVELAND—Kwik-Arc Inc. is being organized to manufacture and deal in metal processing equipment; Anthony R. Fiorette and Herbert A. Horn, attorneys; Mr. Fiorette also acts as statutory agent.

COLUMBUS—Ohio State University has received a bid from Haig M. Boyajohn & Associates, 990 W. Third Ave., for $528,700 for construction of an agricultural laboratory.

COLUMBUS—State Automobile Mutual Insurance, 518 E. Broad St., has awarded a $700,000 contract to Hunkin-Conkey Construction Co., 1740 E. 12th St., Cleveland, for construction of a building; Charles W. Cloud, 630 E. Broad St., architect.

MANSFIELD, O. — Martin Steel Products Corp., Longview Ave., is expanding its plant to provide more floor space.

MT. VERNON, O.—Cooper Bessemer Corp. has been licensed to produce magnesium-treated cast iron, the first license to be granted by International Nickel Co., developers of the material.

WARREN, O.—Incorporation papers have been granted Holinbaugh Tool Die & Machine Co., now doing business on Harrison N. E. Incorporators are Elmer C. and Kenneth J. Holinbaugh and Fred Guarnieri.

YOUNGSTOWN — WARREN, O. — Republic Steel Corp. has opened its new 40-oven coke battery at Warren, increasing the company's coke supply in the Youngstown and Warren district. Work is starting on the second 40-oven battery at the Warren plant. The two units, costing around $10 million, are replacing two old coke batteries, with 64 ovens. It is also building a 38-oven battery at its Youngstown by-products coke plant.

OREGON

KLAMATH FALLS, OREG.—City Clerk C. F. Delap will open bids May 18 for proposed county-city jail building and jail equipment. Plans call for reinforced construction; low bid of $301,602 in 1948 rejected.

PORTLAND, OREG.—Bonneville Power Administration has awarded contract for construction of a 34-mile unit of the 230 Foster Creek-Snonomish transmission line to Smith & White, Vancouver, Wash., for $374,450, involving 182 steel towers, awarded separately.

PENNSYLVANIA

HARRISBURG, PA. — Cook Industries Inc., 12 N. Seventh St., Camden, N. J., will build a $950,000 storage warehouse; plans by C. S. Buchart, York, Pa.

PHILADELPHIA—Department of Property & Supplies, 18th and Herr Sts., Harrisburg, Pa., has awarded a $1,497,770 contract to Wark & Co., 1700 Sansom St., for erection of a hospital building for Philadelphia (Byberry) State Hospital.

PITTSBURGH—Jones & Laughlin Steel Corp. will build a $70 million mill, Third and Ross Sts ; Swindell, Dressler Co., Aspinwall, consulting engineer.

PITTSBURGH—Carnegie Institute of Technology has awarded a $250,000 contract to Crump Inc., 4031 Bigelow Blvd., for boiler plant alterations.

TENNESSEE

CHATTANOOGA, TENN.—United States Pipe & Foundry Co., Chestnut and 27th Sts., will spend $100,000 for additional plant.

TEXAS

BAYTOWN, TEX.—Humble Oil & Refining Co. received a $308,575 bid from Sawyer-Wells Co., Houston, for locker room buildings and clock gatehouse building; project temporarily postponed; Nunn & McGinty, 2425 Ralph St., Houston, architect.

BRENHAM, TEX.—Thomas J. Lipton Inc., c/o Erich H. Feasley, production manager, 1500 Hudson St., Hoboken, N. J., will build a $150,000 plant.

DALLAS—Southern Express Inc., 3131 Oak Lane St., will build a $230,000 warehouse; plans by Herman G. Cox, N. P. Anderson Bldg., Fort Worth, Tex.

DALLAS—Standard Laundry & Dry Cleaning Machinery Co., 3015 Bryan St., will build a $200,000 plant, 6814 Maple Ave.

DALLAS—Eastman Kodak Co., Rochester, N. Y., will receive bids in May for a $1 million plant; Thomas, Jameson & Merrill, 320 N. Harwood St., Dallas, architect-engineer.

EL CAMPO, TEX.—The Texas Co., 720 San Jacinto St., Houston, has awarded a $475,000 contract to Tellepsen Construction Co., 1710 Telephone Rd., Houston, for construction of a compressor, pipe work, cooling tower, etc.

HOUSTON—National Steel Co., 1901 Franklin St., plans to build a $750,000 plant; C. J. Klein, 1303 Austin St., engineering department of Weirton Steel Co., Weirton, W. Va., engineer.

HOUSTON — Following additional estimators, bids to be opened, no date set, for $1.5 million plant for National Steel Products Co., to be located on Lockwood and Armour Drives; American Construction Co., 401 Rusk Bldg.; Ball-Hubbell Construction Co., P. O. Box 1107; O'Rourke Construction Co., P. O. Box 7557; Texas Gulf Construction Co. Inc., P. O. Box 661; Austin Co., M & M Bldg., all of Houston; G. F. Howard Construction Co., Youngstown, Pa.

KARNES CITY, TEX.—United Gas Corp., Fairfield Ave., Shreveport, La., will build a $2 million gasoline plant.

KENEDY, TEX.—Archer-Daniels Midland Co. has awarded a $100,000 contract to Newman Construction Co. for erection of a refinery.

PORT ARTHUR, TEX.—Co-operative Associated Grocery Stores, c/o A. Plettman, president, will build a $250,000 warehouse; L. M. Muirhead, 3560 Magnolia St., Beaumont, Tex., consulting engineer.

WASHINGTON

PASCO, WASH.—Connell Grain Growers has awarded a $145,000 contract to Central Construction Co., W. 918 Mallon St., Spokane, Wash., for construction of a grain elevator.

SPOKANE, WASH.—Mountain States Power Co. plans to improve and expand facilities in Washington, Idaho, Oregon, Montana and Wyoming under a $4,350,000 budget.

SPOKANE, WASH. — Washington Power Co. will spend $4.2 million in a 1949 program of improvements and expansion including additional substations and transmission lines.

WISCONSIN

BELOIT, WIS. — Board of Education has awarded a $2,364,830 contract to Sherry-Richards Co., 201 N. Wells St., Chicago, for construction of a senior high school.

CUDAHY, WIS. — Cudahy Bros. Co. has awarded a $350,000 contract to Permanent Construction Co., 4100 N. Third St., Milwaukee, for remodeling a factory.

PHILIPPINE ISLANDS

MANILA, P. I.—National Development Co. will build a $350,000 plant for manufacturing super-phosphate fertilizers.

CANADA

SANDON, B. C.—Silversmith Mines Ltd. will spend $200,000 in power plant improvements.

NORANDA, ONT.—Ontario Northland Transportation Comn., North Bay, has awarded a $100,000 contract to Courtemanche & Blanchett, Amos, Que., for construction of a railroad building; Brown & Brisley, 12 E. Bloor St., Toronto, architect, Thomas D. Saunders, c/o owner, chief engineer.